THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. SEPTEMBER 26, 1895 CHICAGO, ILL. NUMBER 39.

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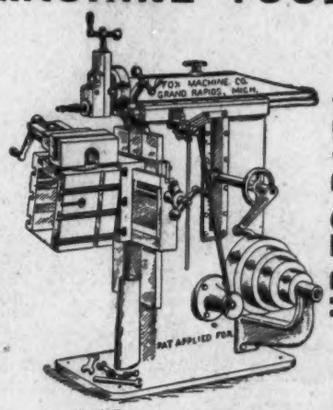

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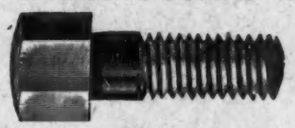

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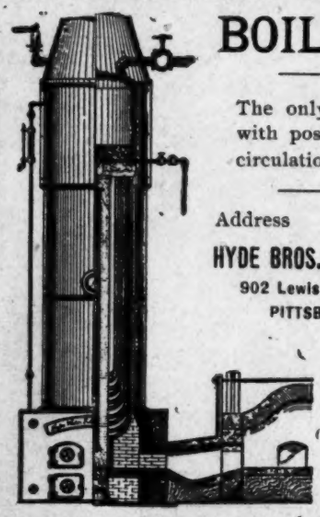

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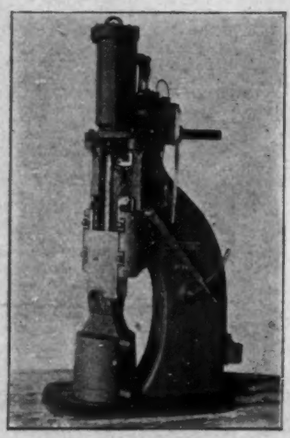

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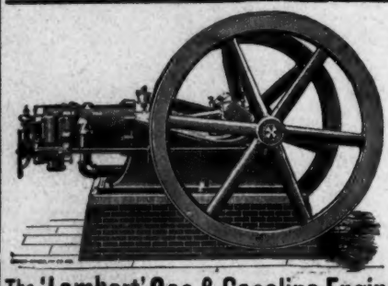

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. SEPTEMBER 26, 1895. CHICAGO, ILL. NUMBER 39

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The double effort put forth recently to stem the tide of advances in iron and steel was temporarily successful. Sales of Bessemer pig iron by a large Western buyer, at prices from 50 cents to $1 below those previously ruling, coming simultaneously with the buying for Pittsburg delivery of two blocks of Eastern iron to be made from imported ores, offset for the time the effect of the generally admitted inadequacy of Central Western furnaces to the enormous current consumption of steel in tributary districts. Yet these events now appear rather as incidents than as important factors. The feeling of uncertainty noted a week ago has given way to greater firmness, and sellers have more confidence in their position. In Bessemer pig iron there has been some buying, on a basis of $17, Pittsburg, a good-sized block of metal being taken at this figure. Minor sales have been made at $16.50 valley furnace. There is a large amount of metal yet to be bought for the first three or four months of 1896, but the big buyers are waiting, and furnacemen who are quite sold up for the balance of the year have no immediate cause to press sales. The position of foundry iron producers is one of continued strength. A small additional freight advance on Southern iron comes Oct. 15. Meantime Southern furnaces are selling for farther future deliveries than were entertained a few months ago. A higher price and larger sale of Ohio Silveries are noted, both East and West, since certain Southern softeners have withdrawn from the market. Lake Superior charcoal which was slow to catch the step, has made more rapid advances in October than any other iron, and is now $15.25 to $16 at lake port. Steel billets are for the time being affected by the peculiar conditions surrounding Bessemer iron. Prices of both in the past two months—leaving out the last fortnight—have been made by a crowding in of unusual demand faster than producing capacity could be marshaled to meet it. Production and consumption seem now to be moving toward a level and a more stable market may be looked for. Pittsburg sales have been at $23.75@$24. In the Cleveland district steel has been quiet. Chicago billet sales were 15,000 tons in the week. Plate mills begin to show greater eagerness for work. A Pittsburg mill has taken an Eastern contract for ship plates, though Eastern bidders made prices calculated to ensure the work to that section. In the Cleveland district, a Western mill compelled Pittsburg to go below what had been accepted as market, and now a sharp struggle is on between Chicago and Pittsburg for several thousand tons of material for an upper lake ship yard. The meetings of the week were of the Merchant Bar Iron Association, at Chicago, which made no change in prices, and of manufacturers of structural steel, at Pittsburg, to perfect plans for standardizing structural shapes. Railroad buying keeps up, but it is largely for track supplies and repair work. Large rail and car orders expected from the West are still held back. Orders for bar iron have been slower of late; rolling mills, as a consequence, are not as free buyers of old material and of close, hard iron as in the summer months.

THE CLEVELAND DISTRICT.

The important event in iron ore, for the week under review, was the decision of the striking Marquette miners to return to work. The end of the ten weeks' struggle does not, however, insure any considerable production of Marquette ore for 1895 delivery. Mines must be unwatered, forces reorganized and many details arranged that will lengthen the stoppage to more than three months in all. There may be four or five weeks of shipments of newly mined ore, in some cases, but the total will be a very unimportant figure. The additional apportionments of standard Bessemer ores from all ranges made recently to help out on the Marquette shortage have been taken up by furnacemen. Gogebic Bessemers have sold at $4.40 and $4.50 and hard Bessemers at $5 in the past week. Lake freights have been a subject of considerable figuring of late. Here and there a $1.30 charter is reported but large ore shippers have not offered more than $1.25 as yet and are quite disposed to stick to that figure. Yet some wheat has paid four cents, the equivalent of a $1.50 ore rate. A feature of the ore market is the number of odd lots sold out, some of them having been on the docks one, two and three years. Several stock piles in the Lake Superior region, long undisturbed, have been sold out in part. There are reports that considerable additional importations of foreign ores have been arranged for lately by furnaces east of the Alleghenies.

Pig Iron. The significance of recent transactions in Bessemer pig iron centering on Pittsburg has been the main topic of discussion among Cleveland and valley pig iron interests in the week. It would appear that of the 60,000 tons of pig iron which Naylor & Co. are to produce from foreign ores in a Sparrow's Point furnace, 30,000 tons went to Pittsburg and 30,000 tons to a Central Pennsylvania steel maker. The recent purchases of the leading Pittsburg interest, 60,000 to 100,000 tons in all, include lots, also, from a Lehigh valley, an Upper Susquehanna and two Pittsburg furnaces. The past week has been quiet in the valleys. Some iron is said to have been sold for 1895 delivery at $16.35 to $16.50, but little of this was offered by furnaces. On the part of producers there is a firmer feeling, and as long as there is little spot iron among them there is no inclination to force an issue as to business for the first four months of 1896. The view of furnace firms with whom we have communicated is that the reaction most likely to come will be toward higher prices, with the probability that a new high water mark will be made when active buying is resumed. Foundry iron shows no change, except that some grades are firmer. This is true of Ohio softeners and of Lake Superior charcoal. On the former recent advances are 50 to 75 cents. Lake Superior charcoal iron has sold in the week at $15.75, Lake Erie port. On some brands $16 is asked. These figures are shaded by other makers, but low stocks and higher lake freights have made a decided stiffening all around. On coke irons we quote $15 in the valley for No. 1 and $14@$14.50 for No. 2, all

Continued on page 6.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The week, generally, has been much quieter on raw material, and several of the local agents say it was the quietest week they have had for some time. The report sent out of declines in prices has found no corresponding reaction here. If anything, quotations are a little stronger, and $15.50 is now regular on local No. 1 foundry. No large orders, involving immediate delivery, could be accepted by furnaces in this vicinity, as they are already overcrowded and shipments slow on old contracts. The Calumet furnace is making iron, but will not be much of a factor in supplying this market, at least for a while. The call for soft steel has been more active. Some 25,000 tons have been booked at full quotations, and the steel company states that the demand is greater than its capacity to the end of the year. Steel rail orders are active in small lots and the mills here so nearly full that they are not seeking new business, but are taking care of old customers as far as possible. There is a fairly good demand for bars, sheets and plates, but structural material, particularly building shapes, shows a noticeable falling off, though less so for bridges. The lull generally perceived in the iron trade at large is in a very large measure due to the protracted heated term, but a revival is looked for during October. The weather was such as to dull commercial business in all lines and that of iron and steel was no exception.

PIG IRON.—For some months there has not been so quiet a week as the one just closed, due partly to the hot weather and partly because most consumers have covered for immediate and near future requirements. The largest buying has been in Southern coke iron, including a contract for 1,150 tons, of which 50 tons was silvery and several smaller orders and carload lots, the whole approximating 2,500 tons for this territory. Local coke iron was very dull, the largest lot sold being for 200 tons and from that down to carloads. Despite this quietude, prices on all grades continue very firm, carlots of No. 1 foundry fetching $15.50 f. o. b. Chicago. Calumet furnace, recently blown in at Irondale, near Chicago, is making a good tonnage and is giving satisfaction. A number of small orders are reported for this brand, none exceeding 50 tons, and several inquiries from consumers who wish to make contracts. Lake Superior charcoal iron is dull—mostly a carload trade, with one order for 100 tons. All furnace agents are looking for a more active buying movement next month as few of the railroad interests, car works and other institutions catering to that particular business, have come into the market for supplies. Sales are being made as quoted herewith:

Lake Sup. Charcoal	$14 50@15 50	Southern No. 2 Soft	$ @13 90
Local Coke Fdy. No. 1	14 00@15 00	South'n Silveries No. 1	15 25@15 75
Local Coke Fdy. No. 2	13 50@14 50	South'n Silveries No. 2	@15 15
Local Coke Fdy. No. 3	@13 00	Jackson Co. Silveries	15 50@16 00
Local Scotch Fdy. No. 1	14 00@14 50	Ohio Silveries No. 1	15 00@15 50
Local Scotch Fdy. No. 2	14 00@14 50	Ohio Silveries No. 2	14 50@15 00
Local Scotch Fdy. No. 3	12 50@13 00	Ohio Strong Softeners	15 00@15 50
South'n Coke No. 2	@14 00	Alabama Car Wheel	17 00@17 50
South'n Coke No. 3	@13 65	Malleable Bessemer	
Southern No. 1 Soft	@14 15	Coke Bessemer	

BARS.—The price of 1.50c on common iron bars is firm in carloads. The demand for immediate shipment is still good and this, too, in the face of a decided bear movement on the part of buyers generally of manufactured material. Sales in carloads up to 100 tons are frequent at current rates, and several large orders for round lots are reported. Guaranteed iron, 1.60c to 1.65c; soft steel bars from strictly billet stock, 1.65c to 1.75c.

BILLETS AND RODS.—There is a good demand for material, the sales of the week being 15,000 tons of billets at $26@$27 and 10,000 tons of rods at $34@$35. Inquiry and actual demand is larger than makers here are able to supply during this year, hence prices are certain to remain steady.

RAILS AND TRACK SUPPLIES.—Small orders for standard sections are coming forward as fast as makers care to have them and they aggregate a good tonnage. Mills here are so nearly full that they are not seeking new business, but are content to take care of regular customers at $29 and upwards—as to section and quantity. Track repair material is active. Splice bars, 1.65c to 1.75c track bolts, 2.25c to 2.45c; spikes, 1.95c to 2c.

STRUCTURAL MATERIAL.—A number of small orders aggregating a fair tonnage is noted for bridge work and buildings. The public library at Milwaukee, Wis., will require about 1,000 tons of beams and wrought columns and is now being figured on. Beams and channels, 1.90c to 2c; angles, 1.85c to 1.90c; plates, 2.10c to 2.20c; tees, 2c to 2.10c. Small lots from stock are ¼ to ½c higher.

PLATES.—Inquiry keeps up well for small mill lots—100 to 200 tons. Mills here are figuring on several large contracts, 2,000 to 3,000 tons of ship plates and tank steel. Prices remain firm and steady as quoted. Tank steel, 2.15c to 2.25c; flange steel, 2.45c to 2.55c; firebox steel, 2.85c to 5c; boiler tubes, 60 to 65 per cent discount.

MERCHANT STEEL.—Another fair week's business is noted, and several orders of 500 to 600 tons were placed. There is still a good deal of contracting for the season yet to be accomplished, and most of it is in sight. Open-hearth spring, tire and machinery steel, 2.10c to 2.20c; smooth finished machinery steel, 1.85c to 1.90c; smooth finished tire, 1.80c to 1.85c; tool steel, 5.50c to 7.50c; specials, 11c and upwards; Bessemer bars, 1.60c to 1.65c.

SHEETS.—Orders continue active for late delivery this year and many jobbers are placing second and third orders as additions to their contracts placed early in the summer. Quotations are firm on black sheets at 2.95c@3c and sheet steel 3c@3.05c for No. 29. Galvanized sheets are still active from mill at 70 per cent off.

OLD RAILS AND WHEELS.—Iron rails are in good inquiry in round lots, and $18.75 was refused by a holder for September and October delivery—selling price would be about $19. A strong demand is noted for steel rails at $14 @$15 as to length and condition. Car wheels are unchanged but quiet at $12@$13—broken, about $13.25 @$13.50, though some holders ask 50 cents more.

SCRAP.—There are now no large lots to be picked up in this market from either dealers or railroads and prices are firm as quoted. A few good contracts are reported for well scattered delivery during the next 120 days. Several railroads are extremely bullish in their ideas in regard to the future of the better grade of old material. Railroad forge, $15.50 to $16; dealer's forge, $13.50 to $14; No. 1 mill, $11; heavy cast, $12 to $12.50; axles, $18; cast borings, $6.75 to $7; wrought turnings, $8.25 to $8.50; axle turnings, $9 to $9.25; mixed steel, $12 to $12.50; stove plates, $6.50 to $7; heavy melting steel, $13.50 to $14.

Pittsburg.

The latest commotion in the Connellsville coke region has never risen to the dignity of a market factor at any time. Therefore the announcement by a so-called convention of workers at Scottdale, Tuesday, that all strikers then out return to work and remain at work until Oct. 10 has no effect on prices. The important operators have acted from the beginning as though they expected no serious trouble, and there has been a steady shipment of coke except as car shortage has interfered, this being a serious problem at some points.

The Bessemer iron market is firmer after the depression of 10 days ago. All the iron originally bought for Western delivery and recently offered by brokers at prices ranging from $15.85 to $16.25 in the valley was taken up promptly. There is very little iron to be had for 1895 delivery except through brokers. Some few sales the past week are reported at figures ranging from $16.25 to $16.50 in the valley. The market to-day may be fairly put at $17.15 Pittsburg. There is no disposition on the part of furnaces to push sales for the first three months of 1896 and there is but little iron offered for such delivery at less than $16.50 in the valley. The Eastern purchases made by the leading interest here are variously estimated at from 40,000 to 60,000 tons. Some 20,000 to 30,000 tons additional was taken from Pittsburg furnaces, the basis being $16.80 Pittsburg. It is known that the Western interest some of whose iron has been sold in this market recently is on the buying side of the market and has a considerable requirement of iron for the first quarter of '96 yet unfilled. Some good-sized purchases on local account are yet to be made for January-April delivery. So that the feeling of furnacemen is still firm. But it is not expected that the situation will be fully uncovered for some time. We quote foundry iron at $15 and $15.25 for No. 1 and $14.50 for No. 2. Gray forge is sold in small lots, because only available as it can be picked up here and there, at $13 75 to $13 90. The situation as to finished material shows little change. While a local mill has taken an Eastern order for ship plates, and there is perhaps sharper competition on the part of plate mills, where order books are being overtaken, mills in general are being well supplied with work for some time to come. There has been no relaxing on the quotations on ordinary business, though it would appear that the check in the advance on raw materials has induced waiting by some purchasers of finished iron and steel. The market for billets has been somewhat weaker, with quotations by brokers at $23.75 to $24 for 1895. A sale of 1,000 tons is reported at $24, and a sale of 1,500 tons at $24.25, delivered October and November. On beams and channels we quote 1.65c@1.70c, with only fair demand; tank plate, 1.85c@1.95c; on bar steel, 1.45c@1.55c; on common iron, 1.45c; on refined iron bars, 1.50c@1.60c. Pipe and tube mills are running full, as heretofore, but the current demand is not equal to current mill shipments and there is a slight easing on prices.

Cincinnati. There has been no excitement during the past week in the pig iron market, but the business has been of generous proportions, and the total tonnage of orders booked is very satisfactory both to furnaces and their agents. There is no special pressure to sell. Two causes may have stimulated the demand, one of which is that the lines north of the Ohio river expect to advance freight rates from 10 to 20 cents per ton on Oct. 15, and the other that some of the furnace companies are disposed to accommodate their large customers by making sales for delivery during the first part of 1896. Some of the heaviest consumers of foundry grades have covered their wants, believing that prices will be no lower, and may be considerable higher. Some of the rolling mills claim that orders are coming to them less freely, and nearly all have bought pig iron to cover their requirements during this year. There is a disposition to defer further buying until later in the season. Ohio Silveries have not participated in the general advance, and in consequence are moving much more freely. It is thought that the furnaces will soon clean out their accumulated stock, and put up their figures at least $1 per ton. We now quote Jackson Co. at $14@$15. Lake Superior charcoal iron continues in fair demand at a higher range of values. Prices, however, are decidedly irregular, there being a variation of $1 to $2 per ton on different brands. This difference is not based on quality of the iron, but on the condition of the furnaces' order books. Current quotations are $15.50@$16.50 on Lake Superior car wheel and malleable. On Lake Superior coke iron No. 1 we quote $14 50@$15.50. In the South the production of iron has decreased somewhat, because of the scarcity of ore, and stocks have been largely decreased by reason of heavy shipments. The situation, viewed broadly, taking in all sectons of the country, is very satisfactory. The present lull was not unexpected, and is not unwelcome to the iron producers. The general impression is that the market is steadily gaining strength.

LAKE SUPERIOR IRON MINES.

At a meeting lasting into the evening of Thursday, Sept. 19, the Marquette range strikers by a vote of 706 to 607 declared the strike off. The steam shovel men had been restive for several days and some of them were about starting for work regardless of the union. Some of the Lake Superior Iron Co.'s employes were reported to have arranged to go back. The strike leaders prevailed on them, however, to await the action of Thursday's meeting. On Monday, Sept. 16, the union sent an offer to the companies to compromise on a scale giving miners $1.90 on contract. The communication asked that arrangements be made also so that the $2 rate originally asked might go into effect Jan. 1, 1896; that all miners be taken bach without predjudice, and that troops be removed before the men resumed work. Verbal answers were given in most cases to the effect that the companies could not pay more than they had proposed in their first offer. Alfred Kidder, agent of the Lake Angeline, replied by letter, saying that the rate of pay would be increased on ore for next year's delivery, "should the ore market continue as good as it now is." There has been only preparatory work at the mines in the past week, and it will be some time before ore will be taken out again. While lower levels are being unwatered, some ore can be taken from those above; but it is agreed that the aggregate for this season will be insignificant. There were upwards of 4,000 men out at all the mines involved. Several hundred have moved to other ranges, chiefly to the Mesabi; but already some of the absentees are arranging to come back, since there will be little winter work at some of the Mesabi properties. It is evident that hundreds of strikers staid away from the final meeting, not caring to incur the displeasure of the union leaders by voting their desire.

The published report of the Lake Superior Iron Co., for the year ending May 1, 1895, shows the following figures and comparison with the preceding year:

Year, May 1,	1895.	1894.	Decrease.
Receipts	$950,257	$1,210,574	$260,317
Expenses	937,282	938,162	880
Net profits	44,562	120,470	75,980
Dividends	84,000	168,000	84,000

Inventory does not appear in the above; hence the items from which "net profits" are derived are not available. Ore mined in the year was 390,640 tons. Ore delivered was 305,886 tons, against 276,000 tons mined and 342,424 tons delivered in 1894. The stock at mine April 30, 1895, was 287,409 tons. Treasurer W. D. Rees says in his report: "The year just closed has been an unsatisfactory one in many respects. The prices obtained for our choice Bessemer ores yielded, even at the lowest cost of mining, but small margins for profit, and the condition of the non-Bessemer market has been such as to leave no margin whatever upon our non-Bessemer ores. There is a better feeling with regard to Bessemers this year, and we shall realize a slight advance over last year's prices but the market price for non-Bessemer has declined."

H. W. KNIGHT & SON, of Seneca Falls, N. Y., have for one of their specialties the manufacture of metallic pattern letters and figures for foundrymen's use on patterns. They furnish letters, also, for sweating on metal patterns, this being the only practicable method of lettering such patterns.

THE IRON TRADE REVIEW

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SEPTEMBER 26, 1895.

WE give large space this week to the Milwaukee meeting of the Western Foundrymen's Association, because of the representative character of the gathering, the thoroughly practical nature of the papers and discussions, and of the verdict of success that must be passed on this first excursion from its home. No small feature of the meeting was the insight given in the visits to Milwaukee foundries, into the importance of the Cream City as a foundry center. The reception to the visitors was hearty, and the event will be recalled as one of the most successful in the association's history. Fifteen firms and individuals were added and the aims of the association and its benefits were practically exemplified to a new audience. We commend the papers on foundry cost sheets and on real and fancied economies in foundry policies, to the careful reading of foundry proprietors, superintendents and foremen. They are good specimens of the every-day character of the work the Western Foundrymen's Association has attempted to do. The Milwaukee meeting gives bright promises for the future of the association; it means a larger field, a more general interest and a better appreciation of the aims of those who have believed foundry practice capable of larger development under the light of free discussion, than under the dark-closet method that secretes every man's difficulties and successes and failures under the dust of his own molding-floor. We take it that not the least gain to attendants at the Milwaukee meeting was in the free interchange of experiences that come after the adjournment of formal discussion, and in which men participated who could not be induced to stand on their feet and talk to a room-full. Certainly the officers of the association, and its wide-awake secretary in particular, are to be congratulated on the success from every standpoint—technical, commercial and social—of these two days of discussions and of shop tours.

THE convention of the International Deep Waterways Association, in session in Cleveland this week, has given a great impetus to the project for a deep waterway between the Great Lakes and the Atlantic. Papers covering nearly every phase of the subject have been read; and the public spirit, the engineering skill, and the business success, of both the United States and Canada were represented among those who prepared this body of literature. Of special interest to the iron and steel trade was the paper by President Moxham, of the Johnson Co., given in another column, in which he discusses the ultimate effect of deep water between the Great Lakes and the sea, on iron and steel manufacturing. We reserve for next week the paper of Hon. Martin Pattison, a fee-owner of Vermilion range mines, who treats of the effect of a deep waterway to the seaboard, on domestic iron mining.

A MIDDLESBROUGH iron market report, dated Sept. 12, reviewing the North of England situation, says that encouraging reports are received from abroad. "More enquiries have been received from America than have been received for years, and no one can doubt that a revival of considerable magnitude has set in over there, which cannot but influence our iron trade." There is enough here to justify the warnings given on this side of the danger of a too rapid advance in iron and steel, which three weeks ago promised to open the door to foreign material. The rise of prices abroad since that time and the halt in the home market will put a stop to negotiations for any considerable importations. Spanish and African ore will come in to a larger extent than was counted on, however, but much of this will be to take the place of Cuban shipments which will be light owing to the embargo of the insurrection.

THE CLEVELAND DISTRICT.—Continued from page 3.

ore. The Buffalo Furnace, whose output is sold through Cleveland, will go out in the week for relining.

Finished Material.

The plates and shapes for two steel schooners that will probably be built at the head of the lakes are the next important order in sight in the Central West, and there is some close figuring. Buffalo also has some vessel work ahead, involving a considerable tonnage in steel. There is a good run of small orders in all finished lines, particularly in steel material. Structural mills find that the pressure is less, as fall comes on, but with work in hand and with the average run of business at this season there is every prospect that they will be steadily employed through the winter. Bar mills have not felt the effect of the car shop, wagon works and agricultural buying looked for with the fall, but prices are firm. The mills are correcting some of the conditions that have grown up in connection with sales through brokers. The movement to standardize weights and sections of structural shapes has made headway and will probably result in action at an October meeting. We quote beams and channels at 1.75c@1.80c, Cleveland; tank plates at 1.95c; bar iron at 1.40c. Billet mills in the Central West are keeping quiet about 1896 business and while the effort to form a pool is so far unsuccessful, there is unanimity in waiting for developments.

A National Bar Iron Organization.

Representatives of the Eastern Bar Iron Association and of the Merchant Bar Iron Association (the Western organization) met in New York last week and decided to call a meeting of all bar iron manufacturers in the country at Pittsburg, Tuesday, Oct. 8. This meeting will consider the formation of an association for the whole country, with a view to fixing delivery prices for all points and establishing ratios between the selling prices in different sections.

Personal.

Andrew Carnegie will sail from Southampton for New York Oct. 5.

Chas. W. Sisson, formerly with Hull & Co., Louisville, Ky., is now connected with the Abram Cox Stove Co., Philadelphia.

Two well deserved promotions have been made by the Carnegie Steel Co., recently. Chas. W. Baker becomes New York sales agent for the company, and Edwin S. Mills succeeds him as sales agent in Cleveland.

REPORTED that the Howard-Harrison Co. has taken a Honolulu contract for 30,000 tons of pipe.

THE WESTERN FOUNDRYMEN'S ASSOCIATION.

The September meeting of the Western Foundrymen's Association was one of the most profitable and enjoyable occasions in the history of that young organization. It was held in Milwaukee on the 18th and 19th inst. For the first time, the Association met outside of Chicago, partly for the purpose of trying the experiment of holding meetings in other western cities, and partly because the Milwaukee members were extremely anxious to have their associates pay the Cream City a visit and sample its justly famous hospitality. A considerable number of the members gathered in Chicago on the 17th and proceeded to Milwaukee by lake that evening, on the steamship Indiana, of the Goodrich line, arriving at their destination the next morning, after a very pleasant trip. So far as known, only one of their number succumbed to seasickness.

Incoming trains in the morning brought other members from various portions of the Northwest, and when the Association met for business in the Plankinton House at 10 o'clock, President John M. Sweeney and Secretary S. T. Johnston found a crowded room. The following gentlemen participated in the Milwaukee meeting:

John M. Sweeney and A. L. Bowen, Chicago Consolidated Iron & Steel Co., Harvey, Ill.; R. J. Cleveland, Cleveland & Barr; James A. Brady, Kurtz & Buhrer Fdy Co.; A. Sorge, Jr., M. E.; E. J. Welch, Geo. Hibben and J. W. Hughes, Weir & Craig Mfg. Co.; H. S. Vrooman, Garden City Sand Co.; E. J. Rodgers, Chicago Chemical Solution Mfg. Co.; W. C. Waterbury, Forster, Hawes & Co.; John K. Mackenzie, Dickman & Mackenzie; L. W. Lukens, Ill. Mall. Iron Co.; A. Schillo, Schillo & Cossman Co.; S. T. Johnston and A. T. Whiting, Whiting Fdy Equipment Co.; John Meehan; H. L. Hotchkiss, Deering Harvester Co.; Jas. S. Winn, Ward & Nash; H. F. Frohman, the S. Obermayer Co.; B. T. Bacon and Jas. Fyfe, Pickands, Brown & Co.; E. E. Hanna and Wm. Ferguson, Gates Iron Works; Geo. W. Cope, *Iron Age;* R. F. Palmer, *Industrial World*, Chicago; J. A. Penton, *Foundry*, Detroit; John Pettigrew, Ill. Steel Co.; W. N. Moore, Joliet Stove Works, Joliet, Ill.; F. M. Lyon, Burlington Route Fdy., Aurora, Ill.; O. J. Colton, Galesburg, Ill.; J. H. Dalton, Walburn-Swenson Co., Chicago Heights, Ill.; T. B. Walch, Frost Mfg. Co., Galesburg, Ill.; D. McLean, Hammond, Ind.; H. M. Lane, the Lane & Bodley Co., Cincinnati; W. R. Warner, Matthew Addy & Co., Cincinnati; W. Meyer, Ph. Meyer Co., Sheboygan, Wis.; H. G. Saecker, Appleton Machine Co., Appleton, Wis.; R. Miller, Appleton Hay Tool Co., Appleton, Wis.; R. A. Cook, Central City Iron Works, Stevens Point, Wis.; G. D. Sheriffs, Western Mall. & Gray Iron Mfg. Co., Pt. Washington, Wis.; J. T. Rowlands, Wm. Gebb and D. Evans, J. I. Case T. M. Co.; John Davies and W. O'Harrow, A. P. Dickey Mfg. Co.; J. T. Llewellyn, Bell City Mall. Iron Co.; L. E. Ellsworth, Racine Hdw. Co.; W. P. Brown, Racine Iron Co.; J. W. Dearsley, S. Freeman & Sons, Racine, Wis.; C. G. Deissner and C. A. Haertel, Waukesha Mall. Iron Co., Waukesha, Wis.; C. A. Sercomb, Schwab & Sercomb; A. J. Bayley and Ed. Weber, Wm. Bayley & Sons Co.; J. Harrison, Sol Shaw and M. N. MacLaren, Jr., the E. P. Allis Co.; E. K. Rundle, Rundle-Spence Mfg. Co.; Capt. I. N. Bean, N. W. & Spring Lake Iron Co.; L. D. Rosenheimer, Milwaukee Mall. Iron Co.; T. J. Neacy and J. L. Monahan, the Filer & Stowell Co.; F. Hoffmann, Hoffmann-Billings Mfg. Co.; J. G. Thompson, Milwaukee B. & C. Works; L. V. Shaw, Louis V. Shaw & Co.; J. Greenslade and O. W. Greenslade, Greenslade Fdy. Co.; John G. Coleman, Wisconsin Mall Iron Co., Milwaukee, Wis.; W. Wilson, Cleveland Facing Mill Co., Cleveland.

The Opening Session.

President Sweeney spoke as follows in calling the meeting to order: "The chair finds it impossible to refrain from some words congratulatory on the very favorable auspices of this meeting. This association is in its infancy, and this is the first flight that it has made from its original quarters. The encouragement which is presented by the large number of gentlemen gathered in this room this morning, is something that makes one feel proud of the organization, and it seems to insure its success. What we desire particularly is to have the objects extensively and thoroughly known. For a time, we found in the conduct of the affairs of this association, that the intentions were misconstrued. It was thought that the questions which were to be discussed were those relating to prices, commercial questions, and that made some jar and misunderstanding. Now, then, we want all of your minds to be disabused of that idea. The object of this association is the interchange of technical ideas and knowledge, and the men we wish particularly to hear from, and who can do more to make this association effective, are the foremen, and the men who do the active work, and if anything can be said which would encourage those people to come forward and talk on the papers and the questions which come up here, I hope each one of you will consider that said to the fullest extent."

A report was presented from the committee on revision of by-laws, that it had been unable to complete its work but would report at the next meeting. The committee on permanent headquarters reported progress. On motion, the committee was instructed to report to the executive committee, and the two committees were empowered to act jointly in determining the matter, without further report to the association.

The secretary reported the following fifteen applications for membership, and all the firms and individuals named were elected: Moore Manufacturing & Foundry Co., Milwaukee; Dawes & Myler, New Brighton, Pa.; Cleveland & Barr, Chicago; Kurtz & Buhrer Foundry Co., Chicago; E. E. Hanna, Chicago; O. J. Oehring, Chicago; Ward & Nash, Chicago; R. A. Cook, Stevens Point, Wis.; E. Bement & Sons, Lansing, Mich.; Lane & Bodley Co., Cincinnati; Frost Mfg. Co., Galesburg, Ill.; Schillo & Cossman Co., Chicago; John Pettigrew, Joliet, Ill.; Waukesha Malleable Iron Co., Waukesha, Wis.; Ph Meyer Co., Sheboygan, Wis.

The Question of Foundry Economies.

The first paper of the day, that of H. Hansen, was then read by Secretary Johnston; subject, "False Economy in Foundry Equipment." [It will be found in full on another page.]

Discussion on the paper was then called for by the president, Mr. Wm. Ferguson being asked to speak first.

Mr. Ferguson: I agree with Mr. Hansen's paper in the main, but I believe that there are instances where shops can avail themselves of their own opportunities by building tools and equipment without going outside altogether. My friend here on the right just told me of an instance in their works where they had some cranes to overhaul, and they got bids on them. The bidders wanted a matter of $6,000 for changing the cranes from rope to electric power, and they themselves went to work and it cost them $2,100. And he told me they got as efficient a tool out of it in the end as they could have got from the other fellows. And I say there are exceptions to all things. What would be called false economy by one man, from observation, might finally prove to be true economy if he were made fully aware of all the conditions in connection with it. We are forced, especially in a jobbing shop where new jobs are coming in every day, to make shift to get a job out, while we know that it is a shiftless kind of rigging. We never expect to see the job again; and to an observer it would seem as though it were practicing false economy to make the job in that way; but to those knowing the conditions, it is clear that it is the greatest economy.

Mr. Hanna: Time is too short to name all the varieties of false foundry economy. I suppose that one of them is cheap men; another is cheap iron—cheap to get out of the foundry, expensive in the machine shop. Cheap men make poor castings and have to make them over again—cheap material all the way through. Economy in any line of business is simply a question of careful consideration of all the points. It may be that, as Mr. Ferguson says, for a job that is to be made but once, a make-shift would cost less, both in time and labor, than it would to make a good, substantial tool to do the work—a tool that if you had hundreds or even ten of a piece to make would pay for itself many times over; yet for one piece, the cheaper tool, the make-shift, is the better. It is simply a question of actual computation as to what the job is going to cost finished. Now the economy point comes in a man's being able to sit down and carefully consider all the points involved in the question. It means that if a man takes up the first way of doing a job, blunders ahead and does it that way that would be false economy. To sit down and carefully think over

the job, figure out all the ways and possibilities and take the cheapest under the circumstances, that is the true economy. About tools: There is no doubt whatever but that if people who are in the business of making tools, are not better equipped and better posted to make good tools than a man that is in general work, there is something wrong with them. It simply means that if you can make your tools cheaper than the people in that business you are either extraordinarily smart, or else the people in the tool business are somewhat behind the times.

The President: I think one point in the question of economy is very likely to arise in the manner that Mr. Hansen has described—that is, the liability to take for granted when only one casting is to be made, for instance, that an inferior rig or method to make it will answer, because there is but one, without stopping to calculate the chances of the loss of that one casting. And what becomes of the question of economy or expense in case you lost one? You would have to, in the end, make a better arrangement, or make two or three castings to get it.

Mr. Pettigrew: I remember some years ago while working in a foundry a party came around and offered to sell some coke to the proprietor for 25 cents a ton less than he was paying. He bought a carload of the coke and commenced to use it. The foundry made agricultural machinery. The consequence was the wheels were all oval instead of round, and other work that before was good was sprung and broken. They couldn't tell for several weeks where the trouble came in. At last it was decided to change the coke and go back to the old material; then everything went swimmingly. I think economy like that is false economy. Take the matter of making tools for the shop. I know a foundryman who needed a crane. He got bids for the sort of work he needed, and they ranged about $400. It was more than he could afford at the time, and he decided to make the crane for himself. He sat down and counted up the actual cost, and it was $62, I think. So you can have it on both sides. And with regard to chaplets. It is only about six months ago that I first saw these made chaplets. A party came from Cleveland to sell them. we were making our own chaplets, and we lost a great many castings from their not being properly made. After we had bought the first lot for, I think, 60 cents a hundred chaplets. I commenced to figure up the cost of the chaplets we had been making and found it was $2.50, besides not having such a good article.

Mr. Moore: The general thought in Mr. Hansen's paper I heartily agree with. There are a great many points in connection with the operation of a foundry economically which are not even mentioned. There is one which occurs to me which may be *apropos* if the present improvement in business continues, as we all hope it will. That is, where is the point in capacity at which a foundry can be operated with the greatest net profit? I think the capacity of the foundry for economical operation is frequently overrated. It is my belief that many of us are carrying the idea that increased volume of business reduces expenses. We carry the idea too far. And I believe if some of the periods in which work was most plentiful and our foundries were operated to their fullest extent were analyzed, it would be found that although they are probably periods of greatest profit, the profit was not made on the extreme end of the volume. When a foundry is operated to the point where efficient help cannot be brought to bear upon the various operations, when you must break in new men and take in hobos, it is our observation that the percentage of bad work increases; that there are all sorts of expenses that come in. Our machinery is overtaxed, perhaps; there are breakdowns, and night work, and Sunday work, and the tendency to looseness in management that must be paid for. And we go through a period of great strength with the idea that by pushing everything to the utmost we are making the most money out of it. Now, undoubtedly, the business will give more profit by being operated fully than it will if it is being half operated, if the organization is complete. But is there any real profit in overcrowding our foundries? I believe there is danger, and the records of the establishments with which I am connected rather go to prove that; that is, they are disappointing. Our periods of greatest activity, when we have been overcrowded and turned out the largest volume of business, have not made returns in profits that they theoretically should, taking the periods of slowness as a basis, and our fixed expenses to be spread over a much larger volume of business. That, it seems to me, is a question which is likely to arise with a great many in the coming year, perhaps it is already upon us. I know a great many foundries are not full up to the brim. It is a question whether we should not rather do what we do with the greatest economy, than to make extra effort and do the things necessary in emergencies and incur the attendant expense. We certainly don't get the contentment out of the business that we do when we are working along with an even load.

Mr. Hanna: Following up Mr. Moore's idea, did anybody ever make anything by working nights and over time? [A voice, "How about Sunday?"] Sunday is worse than nights. I don't believe any body ever made anything by pushing his plant beyond its capacity; but it certainly should be pushed just to its capacity to give us the best returns for the energy and the money invested. And I believe that the larger the equipment, if properly handled, the cheaper we should do our work. The pushing beyond capacity applies in every case, small or large. I believe in buying a good tool and wearing it out just as quick as you can without abusing it; get all the work you can out of it, and get it out quick. That is, if you spend $1,000 on a tool, and you get that $1,000 worth of work out of the tool in one year, instead of keeping it to work for 10 years, you get about nine times the profit from the machinery that you would to run it for 10 years. You get nine times the interest on the money invested. For that reason, every tool should be pushed just to the limit of its endurance in legitimate work.

Mr. Penton called attention to the false economy of trying to secure a foundry foreman at a lower salary than a first-class foreman commands. He regarded it important, too, that a first class mechanic be employed at reasonable wages, rather than to attempt to save 10 or 15 cents a day, to be more than balanced by the loss of a $10 or $15 casting. Mr. Brady had observed not a little false economy in the foundry office. A young man in the position of buyer thinks to save money and contracts for cheaper iron or cheaper coke, which are turned over to the foreman with the expectation that the same results shall be attained as with better materials. He promised to speak further on the subject at a future meeting.

Methods of Recording Costs.

The president then introduced Mr. A. Sorge, Jr., who, he announced, would read a paper entitled "An Example of Cost-Sheets for Foundries." The paper is given in full, with facsimiles of Mr. Sorge's blanks, on other pages.

Mr. Ferguson opened the discussion by asking whether, at the end of six months' operation under the system, Mr. Sorge did not find that much depended on the molders giving their time correctly and whether, if a very good system of weighing and looking after material were not used, there was not a liability of incorrect totals.

Mr. Sorge: Of course, in the matter of labor, there is a check every time the report is made, and in the course of using the system the check comes in through the individual costs that are continually called for. There isn't a day, and hardly three hours in a day, that an individual cost of some kind for one particular piece is not called for, and therefore continual reference made to these tickets kept on file and checked back with former tickets for comparison. The value of the system comes in the fact that you do not burden yourself with a great mass of bookkeeping for individual costs, but the individual cost is obtainable at any moment by referring to the original files, and with a very small amount of labor. The system really tends to correctly divide the labor which is not directly visible, which you can't say was put right on that job. The time may be taken by these tickets or by a clerk going around; but this is immaterial and does not affect the system really. Although I have found this system to work very accurately, I will confess that for a month or two I had considerable trouble, but after a while, when we got numbers of comparisons to make, when we could pick out the individual piece, and a similar piece had been produced some time before, we got so that checks were made which gradually forced the molders into a correct method of giving in their time. By the system of taking care of the material and of labeling it, as it were, the labor of taking an inventory has

been reduced to a very slight thing. I was able at any time to go into my yard and ascertain in half an hour, within 500 pounds, what iron I had in the yard. I could at any half hour in the day, any day, go in and tell you what I had there, and by that means and by following out a similar system in the stock room I was able to make these periodical inventories. Like any other system that is worth anything at all and that produces results at all, continual watchfulness on the men who are carrying it out, is involved. That is necessary for any system; you will get nothing automatically. Where you have a large number of individuals to deal with, you have got to keep watch of the details.

Mr. Ferguson asked whether there was any gain in the system explained by Mr. Sorge, over other systems previously used; whether any reduction in cost was secured. Mr. Sorge replied that the gain was in the ability at any time to compare actual individual records of costs, without having to employ a number of bookkeepers to do it. Mr. Ferguson referred to one instance in which the cost of every piece of casting was kept. There were 100 molders, making 500 to 1,000 pieces a day and it took a clerical force of 12 men to keep track of costs. He questioned whether it was a benefit to know individual cost, and thought tonnage cost was sufficient.

Mr. Sorge: Let me give you an example; we had a case in point. There was an engine being built and a part of that engine broke; the question was to get an estimate on replacing the piece. There had been a customary method of assuming a certain pound price in the value of those castings, right through. In that case we went to work and examined individually the cost of every casting in that engine, and got the pound cost of each individual piece. We found that we had to raise our price on the cost of that piece 50 per cent beyond what we would have done if they had charged the ordinary pound price that they were in the habit of figuring their castings worth. Another thing: There happened to be a period when there were 160 to 170 men all told in the foundry. There was one clerk in the office. He attended to the time keeping and to the cost keeping, together with the weighmaster's assistance who attended to the weighing, and they attended to it all and furnished every individual cost that I wanted at any time. But the value of the whole thing lies, in that system as well as in any other, in a continual series of checks by the man who has charge of it; and in calling for items and comparing them with previous items, so as to avoid getting into a rut.

President Sweeney asked whether the cost of a lost casting was charged to the succeeding good casting. Mr. Sorge explained that each ticket showed what was lost and what was good, and thus in the average good and bad castings were figured in on the cost of good castings. In reproducing a casting some time after the original work had been done, the only safe way, in case there had been lost castings in the first instance, was to reckon on a similar loss in connection with the reproduction. If the whole foundry had been so improved meantime as to obviate much of the loss previously due to inadequate facilities that fact should of course be considered.

Mr. Hanna thought the system would take a good deal of a superintendent's time. He saw the value of the system but questioned whether it were not more economical to employ a man to keep the costs rather than have the superintendent devote time to it. Mr. Sorge answered that in practice all that the superintendent did was to check up and that did not require a great deal of time. The great value of the system was in the fact that the superintendent could call for the record of an individual piece months back and get it fully, so as to check up on the labor and material cost of the same piece, then being produced. He explained his method of filing—a series of cardboards bearing dates, the whole being included in a space 16 inches square and two feet long, for an eight months' record.

Mr. Dalton referred to the system employed in many foundries, of keeping track of the job number. The timekeeper goes through the shop before blast time, and whether a gear, pulley, or what not is being made, charge all to the job number. Helpers', molders', coremakers' time, all are charged to that job number. Put a ticket on the pattern, so the molder can tell what job it is. By putting the pattern number on the check, the cost of the individual casting can be computed and referred to.

In the discussion that followed, in which the President, Messrs. Moore, Hotchkiss, Vrooman and Hoffman took part, the point was emphasized that any system adopted must be persisted in and carefully followed. President Sweeney recalled the saying that a man who couldn't make a system couldn't keep one. Mr. Moore remarked that the skill of the management should be relied on to supply things which the system does not supply, when the information will cost more than it is worth. A good cost system should determine the cost practically and within a very small fraction.

Referring to a remark by Mr. Moore, that any cost system must show an actual balance between the payroll and the labor for the various work done, Mr. Sorge said that this is provided for in his system on the daily time sheet, which at the end of each week shows actual expenditures for labor *in toto* in all classes, which when footed up and compared with the payroll, must agree exactly.

An adjournment was taken at this point.

Visits to Local Foundries.

At 2 o'clock, the association proceeded in a body to Schwab & Sercomb's foundry, where they spent some time in observing the methods pursued in molding rolls for the Illinois Steel Co., parts of hot air furnaces and miscellaneous castings. The firm are manufacturers of the Gilt Edge hot air furnaces as well as wood-burning furnaces for heating purposes.

The members next proceeded to the great shops of the Edward P. Allis Co., manufacturers of Reynolds-Corliss engines, flour mill machinery, etc. They were piloted through the foundry by Superintendent Joseph Harrison, who took great pleasure in exhibiting his fine equipment and in describing the character of the work done. The main foundry building has no less than four electric travelling cranes mounted on the runway covering the central portion of the building, while eight power jib cranes are ranged along the side. The great molding floor was crowded with workmen, the company being driven to its utmost capacity to complete orders in hand. The loam-molding department excited much interest. A force of 25 men is kept constantly employed here in building the brick work for making large castings. One of the cupolas was running on semi-steel, to be used in making chilled rolls for flour mills. A particularly noticeable point about these works is the systematic manner in which the yard is arranged everything being kept in perfect order. The stay here was cut short to complete the afternoon programme.

After gathering in a group to be photographed, the visitors embarked on electric street cars for a trolley ride round the city. For an hour and a half they were conveyed by this pleasant means of transportation through all sections of the city and into some of the suburbs, obtaining in that short time a better conception of Milwaukee's greatness as well as its beauties than would otherwise have been acquired in days. For this, as well as other courtesies, they were indebted to the Milwaukee foundrymen.

The Banquet.

At 8 P. M., the association gathered round the festive board at the Plankinton Hotel for their annual banquet. The tables were arranged in horseshoe form, with the officers at the head table. The daily tonnage of gray iron castings represented on this occasion was 1,000 tons. The total daily melt of all kinds, including the steel works represented, would probably be 4,000 tons.

The following menu, artistically printed, excited the risibles of the banqueters, and put them in a very pleasant frame of mind for the feast:

Tap Out.
Green Turtle, Bull Ladle.
Sliced Tomatoes Sliced Cucumbers.
Broiled Whitefish, a la Manganese.
Potatoes Graphitic.
Larded Filet of Beef, with Combined Carbon.
Scrap Potatoes, Brown.
Sulphur Punch, Roman.
Roast Teal Duck, Stuffed with Pig Iron.
Green Sand Peas.
Chicken Salad, Silicon Sauce.
72 Hour Cake. Plumbago Ice Cream.
Fruit in Flask. Cheese Tested a la Transverse.
Chill Crack-ers. Coffee, Melted at 14 to 1.
Drop the Bottom.

After this very palatable dinner had been served, President Sweeney rapped for attention, and in a felicitous speech paved the way for the subsequent exercises. He made an efficient toast master, introducing each speaker with a well turned phrase, always suggestive of the foundry. The speeches were

alternated with music by the Arlington quartette, one of Milwaukee's finest male quartettes. C. A. Sercomb was first called upon, and in an admirable address he welcomed the Association to Milwaukee. Mr. Sercomb enjoys the distinction of being the son of the pioneer foundryman of Milwaukee, if not of Wisconsin. He was followed by Irving M. Bean, of Milwaukee, president of the Northwestern and Spring Lake iron companies, manufacturers of pig iron, who made a brilliant speech, glorifying Milwaukee and the iron trade. A letter of regret from ex-President Geo. M. Sargent, was read, after which Geo. W. Cope, of the *Iron Age*, made some remarks on the necessity of foundrymen turning their attention to specialties. Other speeches were made by W. N. Moore, S. T. Johnston, A. Sorge, Jr.; John A. Penton, of the *Foundry*, Joseph Harrison, E. E. Hanna, M. N. MacLarin, Jr.; H. S. Vrooman, John Pettigrew, B. J. Bacon and James Fyfe.

Thursday's Inspection Trips.

An early start was made for a trip to Bay View, to visit the blast furnaces and rolling mills of the Illinois Steel Co., on the invitation of Pickands, Brown & Co., sales agents. The foundrymen were met at the entrance to the works by Supt. Geo. L. Reis and Auditor Price, who escorted them to the blast furnaces, which were reached opportunely. A cast was made almost immediately after the visitors had arrived and had inspected the arrangement of the pig bed. They were then taken through the rolling mills, witnessed the work of various trains rolling light rails, heavy shafting, merchant bar iron, quarter-inch round iron, etc., bringing up in the pig iron shipping yard, where they saw the method of breaking and grading iron. A formal vote of thanks was given to the Illinois Steel Co. and Pickands, Brown & Co., for their many courtesies.

The Filer & Stowell Co.'s works were next visited. They found this a well-appointed establishment for the manufacture of engines and other heavy machinery. In the foundry a 24-ton pillow block, which had been cast for an engine for the Illinois Steel Co., attracted much attention. Although just taken out of the sand it was clean and flawless, and veteran foundrymen regarded it with as much admiration as the average man would bestow upon a monument.

The Hoffman & Billings Mfg. Co.'s plant was then invaded. They are manufacturers of plumbers' goods, comprising cast iron soil pipe, brass and iron fittings, valves, etc. The company were also manufacturers of engines, but abandoned that class of work some three months since to concentrate their energy on plumbing specialties. Their brass foundry is one of the largest in the West, containing 24 furnaces, and melting 6,000 pounds of copper daily, almost entirely ingot copper, very little scrap being used. The core room for the brass foundry was inspected with much interest, on account of the delicate work done for small brass castings. The soil pipe foundry came in for much commendation, with its appearance of neatness and decided system. The machine molds were critically examined.

A short walk brought the visitors to the foundry of Wm. Bayley & Sons Company, manufacturers of heavy machinery castings. These works are comparatively new, succeeding the foundry destroyed in the great fire of October 28, 1892. The new plant, however, has been built in another part of the city from the former location, to secure greater space. The foundry is equipped with two electric traveling cranes on the runway through the center of the building, and another is shortly to be installed to run on the side, when all portions of the buiding will then be served in this manner. The company are now very busy on ice-making machinery for the Vilter Co. They furnished the visitors a souvenir of the occasion in the form of a book of photogravures of the Milwaukee fire of 1892, together with an artistic pen-wiper. Before leaving this plant, a meeting of the Association was held, at which a vote of thanks was given to C. A. Sercomb and the other Milwaukee foundrymen, for their assiduous devotion to the entertainment of the visiting members. This ended the official visitation by the Association. Some of the members called to see the works of the Nordberg Manufacturing Co., builders of engines, but the majority made preparations to travel homeward.

Notes.

The large attendance from Racine was a subject of favorable comment. Of nine foundries in that city, seven were represented. A very cordial invitation was extended to the association to hold one of its meetings in that city.

The Whiting Foundry Equipment Co. was represented by A. T. Whiting, who furnished the members of the association with interesting information on the latest arhievements of his company in devising improved methods of foundry equipment.

H. S. Vrooman, of the Garden City Sand Co., Chicago, presented each member with a very handsome leather-bound memorandum book.

Harry F. Frohman, of the S. Obermayer Co., Chicago, manufacturers of facings and general foundry supplies, distributed very tasteful matchboxes as souvenirs of the meeting.

DEEP WATER WAY AND STEEL MAKING.*

BY ARTHUR J. MOXHAM.

The ultimate effect of deep water between the great lakes and the sea, on iron and steel manufacturing, is entirely a matter of distribution of finished production.

It may be accepted as an axiom in manufacturing science that true comparisons are only obtained when prices are at their lowest ebb, and it is only by comparison that any general law can be reached. A naked fact, standing alone, teaches but little. If we are told that Pittsburg can make a steel bloom at $15 a ton, and are told nothing else, we have learned nothing. If we are told, in addition, that the eastern districts can make a steel bloom at $17.50 a ton, we know more; if, still further, we are told that the freight between the two districts is $2 per ton, we know all that is necessary, because comparison becomes a possible thing.

Close cost-sheets are not needed for our purpose: Trade is exchange: Exchange means movement from one spot to another spot. Through the whole civilized world there exist steady and continual tides or currents of trade, just as distinct as that of the Gulf Stream, and as powerful and certain in their action as that of the Mississippi river. E. G.: during the whole of the recent depression the Mahoning and Shenango Valleys poured their pig metal into Pittsburg, and Pittsburg poured its steel into eastern markets. During the same period, Chicago poured its steel into the west, and both Pittsburg and Chicago found the current of their trade met in equilibrium in the central lake district. During this same period, eastern steel plants and blast furnaces were idle, swept silent for the time being by the current passing their doors. It needs no cost-sheet to prove that the central district was at this time making cheaper steel and iron; nor does it need argument to prove that the district tributary (as this district is) to the great lakes, is the natural home of the iron and steel industry of this country.

The first analysis does not stop here. What of the rest of the world in our comparisons? If we turn to the past, we have no current of trade outwards; but we have something else that is worth noting. From 1871 to 1887 there was a current, and it was a steady one; there was no doubt as to its volume; nor any as to its direction. Its volume was large, its direction this way. This country was a steady importer of iron and steel from Europe. In 1887 this current slacked up; in 1892 and ever since it has been at a standstill to all practical intents, so far as staple products are concerned.

It is an old saying that "Nature abhors a vacuum." It is equally true that natural laws never stand still. When motion comes which way will the current trend? For many years manufacturing cost in England and Germany has not decreased. Improvements in the art of making, improvements in machinery, have grown apace, and both reduce the cost. In spite of this the net result has been nearly stationary in prices. In England, rails sold at $28 in 1880; twelve years afterwards (in 1892) at $26.25. This means that in England other costs have increased in corresponding ratio to the decrease due to improvements.

What has been our history?

Taking steel blooms, the largest steel staple free from pool influences: In 1889, the price was $35 per ton; during the succeeding years until 1894 the decline was steadily downward, till the figure of $15 per ton was reached. Even in rails a strong pool has scarcely done more than regulate the steady

*Read at the first annual convention of the International Deep Waterways Association, Cleveland, O., Sept. 25, 1895.

progress of a decline; for in 1889 the price on rails was $34 per ton, and in 1894 it reached $22. In the interval a stubborn and steady decrease. Is it not rational to predict which way the tide is to turn? Does it need any prophecy to say to-day that the United States is to be the future home of the iron and steel industry?

During 1895, we made pig iron in the Mahoning Valley at $9.50 per ton for Bessemer iron. An average English cost for the same period was nearly $9.90 a ton; the German cost still higher. Market changes may delay the turn of the tide—it will only be delay. A "boom" may flood this country for the time being with foreign products; but this is not of the question. The trend of the future, putting temporary disturbances on one side, is already pointed out and clear-cut.

For the next generation the great lake district will be the controlling influence in the iron and steel trade of the world.

I havs stated that the effect of deep waterways on the iron and steel business is entirely a question of distributive freights. The three component items that enter into its manufacture are iron ore, limestone and coal (in the form of coke). On the two former we already enjoy the benefit of a deep waterway; on the latter (coal and coke), nothing but a diversion of the route via Pittsburg and Connellsville, could influence the problem; and while a deep waterway in this direction is demanded, and will ultimately be achieved by the Pittsburg district, it is not likely that an ocean route would be continued in this direction. The coal and coke haul is likely to remain as now for a long time to come. But on the question of the proper distribution of the manufactured product, the problem of the deep waterway is of all-absorbing influence. The steel staples represent a low grade of railroad freight, and yet in 1894 this freight averaged about $2.60 a ton from Cleveland to the seaboard, or 43 cents per ton per mile. A manufacturing concern, with which the writer was connected, shipped its goods over the whole United States from a fairly central point. Its average freight rate (on both long and short hauls) for 1894 was $2.17. The lake haul during the same period, on iron ore, averaged 80 cents for 825 miles, or about one-tenth of a cent a ton per mile, being only about one-fourth of the low grade railroad haul. With all allowance for the increased cost of rails over ore and lockage over open lake traffic, it would be but reasonable to estimate that a cost of only $1.30—if not as low as $1—could be safely reached to the seaboard, or a saving of, say, $1.30 per ton.

To measure the influence of such a reduction, it must be remembered that even the most favorably located steel factories were scarcely doing more than coming out even, during 1894, and many were operated at a loss. The effect of such a reduction in freights would be far-reaching. On the low basis of 1894, $1.30 per ton saved at the seaboard would have put, during this period of depression, a large part of the civilized world at our feet. It is well known that a decrease of a small amount in price enlarges a market far beyond its own percentage. Had we, in 1894, only increased our market 20 per cent, we would have had no panic, so far as steel and iron were concerned. This is but a first effect; while the central district could have relieved the east from a competition that bore it down to temporary ruin, the east in its turn would have had other relief. On ore, the deep water freight would have been still lower than on rails; and such points as Sparrow's Point, Chester, Pa., and others, could have looked for ore at, say, $3.60 per ton, instead of the $4.50 that perhaps represented the average real price of foreign ore; to say nothing of the fact that the assortment offered by the lake ores makes them a cheaper mixture, even at the same price.

To this must be added the immense saving of the transfers that today would be needed for export trade. As we have no iron or steel exports to guide us, we can only surmise what it would amount to. On grain the cost of transfer has lately been 1⅛ cents per bushel at Buffalo, while the lake freight from Duluth to Buffalo—the longest haul on this same grain—was 2¾ cents per bushel, and from Chicago 1⅝ cents per bushel. This is supplemented by a further transfer to ocean steamer at New York at a cost of 1⅜ cents per bushel; the two transfers thus equaling the freight on 800 miles.

In the above, we have dealt only with periods of depression. In normal times the advantage of the deep waterway would be equally great. During 1894, the number of idle boats on the lakes was legion. It would have taken much courage to have anticipated a paying use for this tremendous fleet for many years to come; and yet at this moment—within one year—there is a scarcity of boats. It is estimated that without any contribution from the grain trade (now about to pour its volume on the lakes), there are not boats enough to bring down the ore that is needed for this year's demands. Many good judges attribute, principally, this state of affairs to the sudden advance in the price of steel and pig metal, which cannot but be unhealthy because of its great rapidity. With open communication with the sea, such a state of things could not exist. Boats in small demand elsewhere would pour into the lakes, traffic be maintained on a free and healthy basis, and a great industry be relieved from being made a cat's-paw of mere chance. This, too, to the good of the lake marine. It is the false profit of a day, the will-o'-the-wisp of unnatural conditions, that creates that false relation between supply and demand which works injury to all, and builds for today a tonnage that may be idle tomorrow. Better for our lake marine to invite in the stranger to aid in the day of extra exertion, with the certainty of in his turn being able to share the stranger's mess of pottage, than to soar in the clouds at one turn of the hand only to stagnate in idleness the next.

To the railroads the deep waterway would be a boon beyond measure. While not admitted by the railroad fraternity, it is true that there has never yet been a well conducted system of waterway improvement that has not developed the adjoining railroads beyond all calculation; not only in relieving them from the low grade, non-paying freight hauls, but in more than replacing the deficit by the higher grade freight that is needed for the miscellaneous wants of the increased population induced by more favored manufacturing of staples to locate along its line. Statistics are not needed. Take a map of the United States and count the number of railroad lines that run to and from all the seaports and every lake port of any magnitude. Compare these at the same glance with those of interior cities, and then ask what brings the larger number to those ports tributary to water. If it does not pay them why do they come there?

I can only conclude by urging that to the iron and steel trade of this country so great would be the advantage of the deep waterway that it would be revolutionary in its effect. So sorely is it needed, that it is certain in its ultimate coming. More than all things else, would it contribute to putting this country in its natural and proper place as the first steel producer of the world.

Better Wages for Finishers.

The recent conference between amalgamated officials and representatives of Western bar mills, to compute the wage scale for the 60 days, beginning Sept. 1, reported advances due the men, as given below. The puddling rate having been voluntarily advanced Aug. 1, in anticipation of the higher basis remains the same:

	Old rate per ton.	New rate per ton.
Puddling	$ 4 25	$ 4.25
Scrapping and busheling	1 55	1.58
Knobbling	3.80	3.88
Shingling muck iron	.607	.62
Shingling charcoal iron	.666	.681
Heating and shingling slabs	.607	.62
Bar rolling and heating	.567	.579
Heating pipe iron	.51	.52
Rolling pipe iron	.51	.52
Rolling on plate and tank mills	.54	.552
Heating on plate and tank mills	.648	.662
Rolling pipe iron on sheet mills	2.75	2.82

On structural mills, an advance of 2 per cent is made in the wages of all. The new rates do not affect the sheet mills or the scale recognized in tin and black plate mills. The latter depends on the ratio between the prices of billets and of tin plates. This ratio has gone below that existing when the minimum rate was fixed. Sheet mill prices, it was found on canvassing the matter, had not advanced so as to justify an increase.

THE Peoria Rubber & Mfg. Co., of Peoria, Ill., has been formed, with a capital stock of $200,000, for the purpose of manufacturing bicycles. The company's new buildings will be ready for operation within 60 or 90 days. An order has been placed with the Lodge & Davis Machine Tool Co., of Cincinnati, for the equipment of the plant, including engine lathes, milling machines, shapers, drills, screw machines, hub machines, etc.

FALSE ECONOMY IN FOUNDRY EQUIPMENT.*

BY H. HANSEN.

Most of you will probably say that you are as well acquainted with economy as you care to be; that your acquaintance with economy has taken the last degree of familiarity which you can tolerate; that another dose of this not altogether agreeable compound may end disastrously. Any one acquainted with the foundry business knows that at the present time the operation of a foundry compels the injection of several grains of economy at different places in order that there may be something left on the right side of the ledger.

The term economy poorly fits too many of the savings made in the foundry. Not everything that makes a saving possible is economy; some attempts at saving might better be labeled extravagance. That the foundry industry has been prolific in examples of bad judgment and of calculations that failed to materialize is shown in the many wrecks by the wayside and in dividends that were far smaller than anticipated. The best is the cheapest, though some founders apparently act on the principle that the cheapest is the best. To such it seems economical to employ any article or tool that answers the purpose. It is said that a penny saved is a penny earned. I have seen foundries in which a penny saved has been a dollar lost.

American tools and appliances are said to be the most efficient in the world. But American tools did not become so universally approved by the efforts of the village mechanic, nor by every shop contriving for itself whatever labor-saving device was needed. It was only by a concentration of mechanical skill and experience that American tool-builders made themselves famous for the high standard of efficiency, the general utility and the simplicity of their products.

Shops producing their own tools exclusively are becoming scarce. Home-made contrivances are giving place to machinery perfected by specialists and installed on the purely business principle that they will lower the cost of the product. Making a special study of the needs of each industry has not only furnished better tools but decreased their cost in corresponding proportion. The machine shop that would undertake to build a lathe or boring mill for itself would find itself greatly handicapped in the matter of cost, when compared with one of the regular tool works. But even leaving the question of first cost aside, how would the home product compare with that of a firm making a business of building such tools? Would it give the same degree of efficiency with the same expenditure of power?

Power costs money, whether the prime mover be a foreign laborer at a dollar a day or steam, air or electricity. Any tool that requires a greater amount of power than others of the same class and efficiency is not economical. Yet how many foundries disregard this altogether, and purchase tools that are sometimes called regular steam-eaters, because they are cheap and then pay the difference many times over in extra cost of operation.

The manufacture of foundry tools is becoming a trade of itself, and the men engaged in it are bending every energy toward developing superior appliances for the foundry. The ordinary chaplets, for which almost every foundry used to rely on the blacksmith nearest at hand, and which have probably been the cause of more castings being discarded and patched up than any other thing of their size, are being made by special methods and presented in a far superior condition, besides being placed on the market at a price which would not keep a blacksmith in tobacco. At the same time there are many foundries that still insist on making their own inferior chaplets. Are they practicing economy?

Not long ago I was employed by a firm who concluded to make a grinder themselves rather than purchase one. They had the draughtsmen, pattern-makers, machinists and molders, with plenty of wood and pig iron in the background, so it entered their mind that there could not be much expense attached to converting this into whatever they saw fit. Owing to the ignorance of their foundry foreman, who was not accustomed to this class of work, the main casting or bed was cast three times before producing a passable piece of work. The smaller parts went the same way, and there was hardly a piece connected with it that was made on the first trial. In nearly every case success only came after some experience had been paid for. When it came to assembling, I have a distinct recollection of several pieces refusing to be put together. Parts which should have been cast separately were consolidated to make it easier for the pattern-maker and machinist, with the result that lugs and projections protruded in such a manner as to resist all attempts at bringing them together. When I last saw these relics of an ill-fated enterprise, they were covered with dust; and although times were dull and several shut downs became necessary, this firm who were going to make this machine so cheap, never said a word about finishing it up and getting it ready to work.

The proprietors of a neighboring foundry about the same time found themselves in want of a crane to replace an old rattle-trap that threatened to fall down and carry with it more destruction than it was worth. Inquiring of several dealers in foundry equipments, they were surprised to learn that a crane would cost more than the charge for freightage. But they found a way to overcome this difficulty. They had a machine shop and foundry, they had all kinds of materials that are supposed to enter into the composition of a crane. They had men, too, who knew how to use up such material, so why should they not make the crane at home and get just what they wanted? But the making of cranes was not their business, so a well paid employe was entrusted with the gathering of information on this subject. After a month spent in visiting places where cranes were in use, measuring their dimensions, finding out the ratio of their gearing, the size of chain used, etc., they were ready to make what patterns were necessary and borrow and make answer whatever shortshifts they could make up.

Perhaps you think they didn't make that crane work; but they did. And I understand the intention was to cast a fancy name-plate to adorn it, but this motion was reconsidered when they discovered the amount of power they had to furnish this creation of theirs before it would budge. Power is money and if this foundry practiced economy in building a crane, say, 25 per cent less than they could purchase one, when it required 75 per cent more power to operate it, I want you to tell me where it is.

It takes a man with good abilities to become a good imitator as it does to be a fair originator. In fact, it takes a very smart man and mechanic to execute a first class job of imitation. It seems the easiest thing in the world to take a machine to pieces, secure its measurements and turn out duplicates. Yet how many of such imitations have the efficiency of the original, when assembled and put through the real test of actual work?

As amateur tool builders, most of our foundries do not achieve success. They may for a while be deceived by the external appearance of things, yet we all know how soon a dollar's worth of extra labor can be consumed on a crane or other tool without exciting suspicion. Such leaks are common and increase the cost of every pound of castings made, but it is seldom a determined effort is made to locate them. There might be some unsavory disclosures that would endanger the position of many a designer, attempting to administer to the wants of people with whose requirements he was entirely unfamiliar.

The admiration we show for the work accomplished by a tool is doubly increased if it only requires a minimum of power in its operation. Although none of us entertain the idea that work can be performed without the consumption of power, yet we have a high regard for those tools that get along with the least. We all recognize the advantage these have over others that call for a larger expenditure.

It is a false economy that suggests to many of our foundrymen to-day that labor-saving tools can be made at home and reach the same degree of perfection attained by builders who devote their whole time to tool-building exclusively. Without reserve, not one foundry in ten can produce a creditable tool, simply because such an attempt involves entering strange fields where experience must largely be paid for in failures.

*Read at the Milwaukee meeting of the Western Foundrymen's Association, Sept. 18, 1894.

IN the yards of the American Pig Iron Storage Warrant Co. there were 113,000 tons of iron Sept. 20, 1,500 tons less than on Sept. 10.

AN EXAMPLE OF COST-SHEETS FOR FOUNDRIES.*

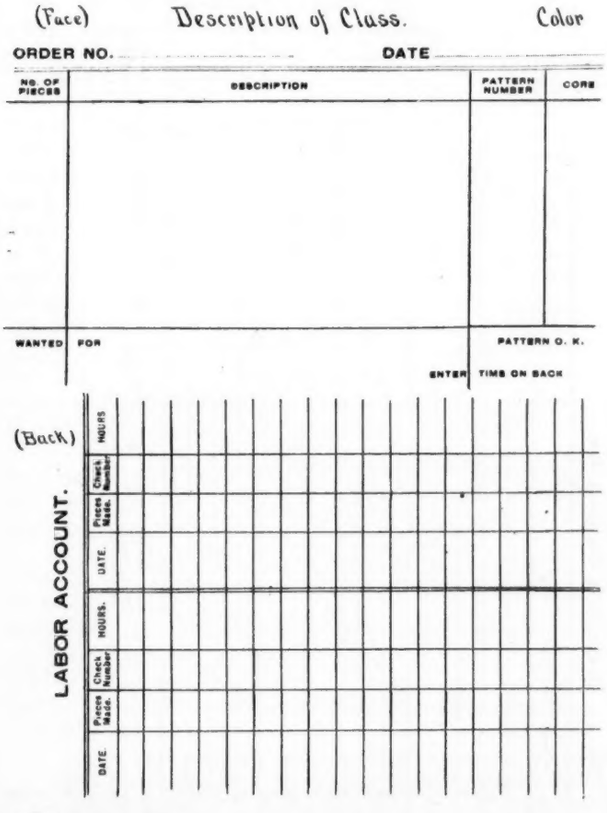
BY A. SORGE, JR., M. E.

In a recent article on foundry costs appearing in the issue of the *Iron Age* of Sept. 5, 1895, I gave the main features of an analysis of foundry costs. My object in that article was to call attention to the necessity of logically dividing the indirect items of labor, material and expense in an equitable manner among the various classes of products. I did not multiply the reasons for such divisions on account of the lack of space, but a careful consideration of each individual item that enters into the total cost will readily indicate the proper division or proportioning of same according to the amounts of other previously determined quantities. It is necessary that we start a practicable system of costs with one or two items of which accounts are kept accurately classified. Then it is generally possible and perfectly rational to divide other items, whose total only can be easily determined, among the various classes according to the proportion of one or the other of the accurately determined accounts. Perfect accuracy will not be the result of such a system, but as I stated in the article above referred to, such perfect accuracy can only be attained by the use of a large clerical force to keep accurate classified account of each particular item, thereby involving such a large expense for book-keeping that the same would more than outweigh any possible profit.

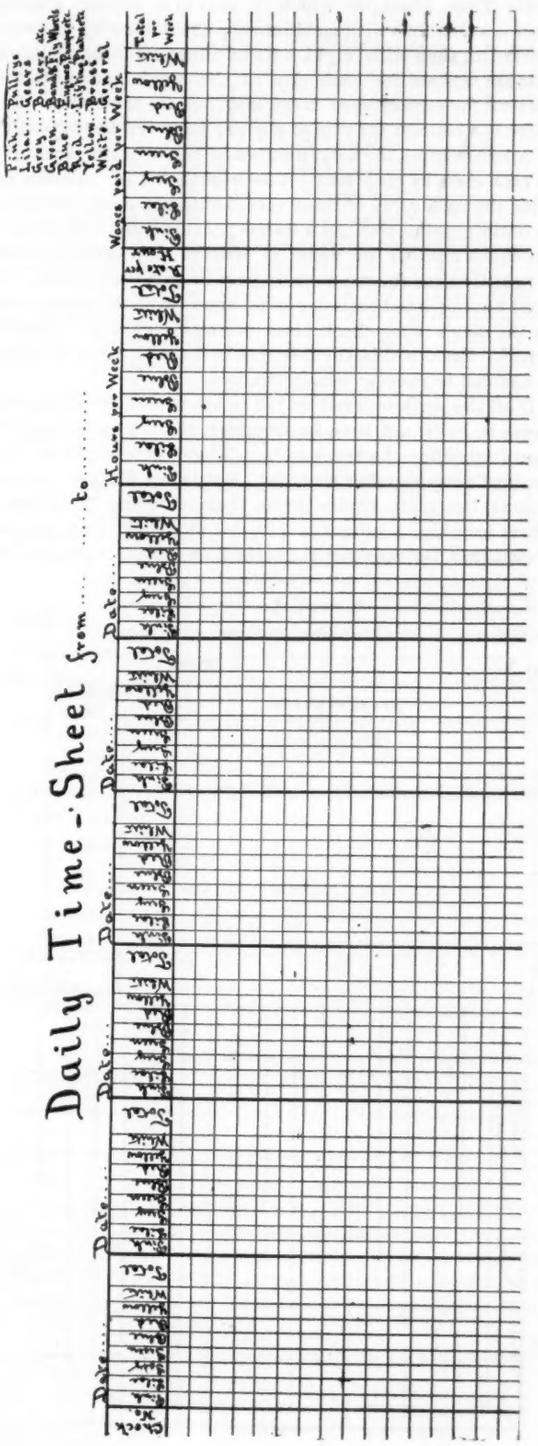
On the other hand the inaccuracy introduced into the cost, when the items have been proportioned on a logical basis, and the classification has been carefully determined so as to collect work of a similar character into each class, will be so slight as to become inappreciable.

Bearing in mind these general propositions, I have prepared a set of forms which would be applicable to a foundry doing a varied lot of work. Naturally I do not expect that these particular forms will suit any particular person's case, but they will illustrate the system and the explanation of the routine followed will serve as a guide for any other work.

Starting with the classification, I have found it advisable to distinguish the classes, not only by their description or names, but also by different colored blanks, samples of which I submit herewith. You will note that there are eight classes, thus: pulleys—pink, gears—lilac, boilers, etc.—grey, engines, etc.—blue, lifting plates, etc.—red, brass—yellow, general castings—white. Each class is distinct in itself, although the classification in this case is arbitrary, owing to peculiar circumstances governing the methods of manufacture. However these examples will serve to show the routine to be followed.



Each pattern as it comes from the pattern-shop has one of these colored tickets attached to it, and the man receiving it receipts for it at the lower right hand corner. The ticket is the order for the molder and states the number of pieces



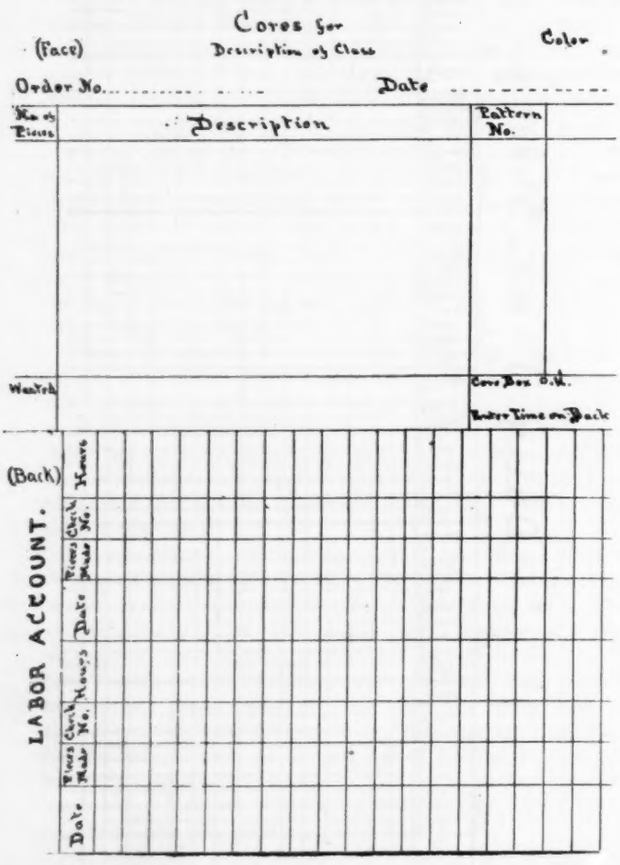
required, a short description of the piece, its pattern number, the date of order and order number. Also a column is provided headed "Cores" into which the number of cores is written and it is stated whether stock cores or special cores. Also any instructions as to special quality of metal or special hurry of work, etc., are noted on the face of the ticket. At the same time a similar ticket of like color, and of which I exhibit only one sample, is attached to each special core box.

The molder's ticket goes into the foundry with the pattern, while the core-ticket goes into the core-room with the core-

* Read at the Milwaukee meeting of the Western Foundrymen's Association, Sept. 18, 1895.

box. Each day that the molder works on the special piece or pieces named on the ticket, he fills out the columns ruled on the back of the ticket with the time spent, and also puts down the time spent by any other molder or helper who may be working with him. The core-maker does the same thing with any special cores for which he may have received orders. Each evening all tickets of work on which progress has been made during the day are handed in to the clerk at the same time that the regular time-check is deposited. The clerk posts this time each evening into the proper column on the Daily Time Sheet, of which I herewith submit a sample. This is ruled first with a column for check number or name of workman, then with eight sets of nine columns each. The first six sets are for each day of the week and contain one column for each class of work and one for total time. Then there is a column for rate of pay per hour and the seventh set of columns gives the total number of hours in the week given to each class by each man. The eighth set of columns contains the cash value of these total hours per week carried out in dollars and cents. As a line is provided for each man and his check number or name is written first therein, it takes very little time for the clerk to post in each day's work. The total hours posted each day must agree with the hours shown by the man's time-check, thus giving a means of correcting errors. Besides this, the foreman looks over these tickets and is enabled to prevent wrong charges.

If all the work ordered on the ticket is completed, the clerk keeps it, but if not, then he returns it the next morning to the man from whom he received it. The tickets which he keeps are filed away together each day. But before filing or returning tickets the clerk copies from them into the Daily Product Sheet (of which I submit a sample) all work that was completed that day, whether it finished up the order on the ticket



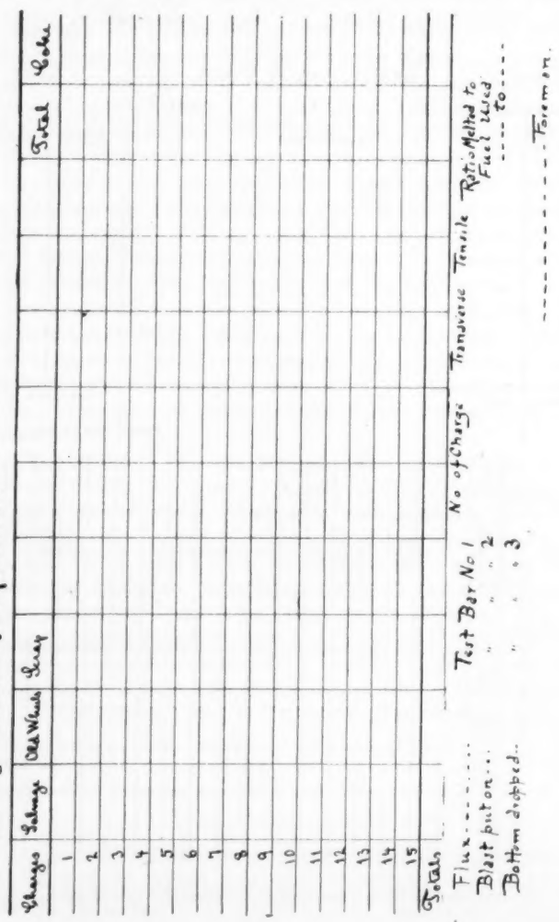
or not. The headings of the columns of this sheet are: Molder's Check No., Order No., No. of Pieces, Description, Pattern No., Class, Date Shipped, and Weight, besides the general heading, giving the date when cast. The first six columns are filled out by the clerk, and the sheet then contains a full record of all the work reported cast in the foundry on that day. He hands this sheet to the foreman who examines it and then passes it to the weigh-master in the cleaning room. The weigh-master must furnish an account of the weight and disposition made of each piece on the list, by filling out the last two columns. Should any piece be defective he so notes on the sheet in place of the date of shipment. At the same time he makes out a new ticket for the foundry to make another piece and heads this ticket Replace Order. This ticket is treated exactly like an original ticket. The weigh-master also keeps a book for bad or defective castings in which he enters each day all the work that has been spoiled, giving description, pattern number, weight and class, as well as date.

The time of all the men employed in cleaning castings is taken on a special sheet, which is like the Daily Time Sheet, only smaller, and has a column added for weights. After a number of trials I found that the labor by classes averaged very closely according to the molder's time, and therefore only the total daily time of each man is taken. From the Daily Time Sheet the relative proportions of molder's time in each class are readily determined and the clerk then divides the casting-cleaners' time accordingly. The weights for each class are entered daily by the weigh-master.

The time of coremakers and helpers is taken in the same way as the time of molders and helpers, namely by tickets, when work has been done on special cores. Work on stock cores is reported to the clerk when the tickets are handed in, and makes up the balance of the day's work not shown on the tickets. Each day the foreman coremaker reports the material consumed in his department during the day.

All other labor around the foundry is simply posted *in toto* each day in the Daily Time Sheet.

The storekeeper has a book in which he keeps separate accounts of the various materials of which he has charge. He notes all materials received and also all materials given out, and makes a balance of each account every four weeks, showing the amounts used. These amounts he reports to the clerk. Periodically an inventory is taken, so as to check up the storekeeper's accounts. All pig iron, coke, sand, slabs, flux, etc., are at once charged in proper accounts kept for this purpose by the clerk. There is an inventory taken of these materials each four weeks, the amounts used up being credited to the proper accounts. Each day the cupola tender hands in, for each cupola, a detailed report of all materials consumed in the cupolas. These reports are made out on special blanks as per attached sample. Besides giving the



detailed composition of charges, the various tests are entered on this sheet, and also the most important castings made, stating from which charge the iron was taken. At the end of each four weeks the totals consumed as per Daily Cupola Reports are compared with the totals shown as consumed by the inventory, thus furnishing frequent checks on wrong weighing, etc.

In the general ledger of the foundry an account is kept headed Expenses. In this account are two divisions, one Expenses proportioned to weights of castings, and the other Expenses proportioned to labor. Under Expense proportioned to weight are charged all expenditures for shipping, cartage, care of and receiving patterns, a periodically determined amount for depreciation of the plant, and interest on same, and salesman's salary and expenses. Under Expense proportioned to labor are charged all expenditures for power,

Labor. (Face)

Total Cost of Labor Classified.

	Pink	Lilac	Grey	Green	Blue	Red	Yellow	White	Totals
Moulders									
Core Makers									
Helpers									
Cleaners									
General Labor									

Labor Cost per pound of Good Castings

	Pink %	Lilac %	Grey %	Green %	Blue %	Red %	Yellow %	White %
Moulders								
Core Makers								
Helpers								
Cleaners								
General Labor								

General Labor Items.

	Moulders Days	Moulders Days %	Core Makers Days	Core Makers Days %	Helpers	Cleaners	General Labor	Sundries
Number employed								
Highest Wages paid								
Lowest " "								
Average " "								
Labor per pound cast								
Per cent. of Labor								

Material

Grade of Iron	Net Weight	Cost	Grade of Iron	Net Weight	Cost

Total Iron Used
Salvage etc
Total Iron Melted
Coke used in Cupola

Foundry Supplies		Core Room Supplies	

Total
Grand Total Cost of Materials and Supplies

Total Material Costs Classified

	Pink	Lilac	Grey	Green	Blue	Red	Yellow	White
Materials								
Foundry Supplies								
Core Room "								

Material Costs per pound Good Castings Classified

	Pink %	Lilac %	Grey %	Green %	Blue %	Red %	Yellow %	White %
Materials								
Foundry Supplies								
Core Room "								

(Back)

Expense Totals

Name of Account	Overtime	Total hours	Cost
Power, Heat and Light			
Superintendence and Clerks			
Interest and Repair of Buildings			
Taxes and Insurance			
Shipping and Cartage			
Care of Patterns			
Sum Total			

Castings Produced.

Class	Description of Class	Good Castings lbs.	Bad Castings lbs.	Percent. Bad to Total
Pink	Pulleys			
Lilac	Gears			
Grey	Boilers etc.			
Green	Band and Fly Wheels			
Blue	Engines, Pumps etc.			
Red	Lifting Plates etc.			
Yellow	Brass			
White	General			
Totals				

Total Expense Costs Classified

Name of Account	Pink	Lilac	Grey	Green	Blue	Red	Yellow	White

Total Cost of Castings per pound Good Castings Classified.

Class	Labor	Material	Expense	Total
Pink				
Lilac				
Grey				
Green				
Blue				
Red				
Yellow				
White				
Average				

Expense Costs per pound Good Castings Classified

Name of Account	Pink %	Lilac %	Grey %	Green %	Blue %	Red %	Yellow %	White %

General Summary.

Total Cost Labor	
" " Material	
" " Expense	
Grand Total	

Fuel

	Cupola No. 1	Cupola No. 2	Cupola No. 3	Average
Iron Melted				
Fuel Used				
Proportion				

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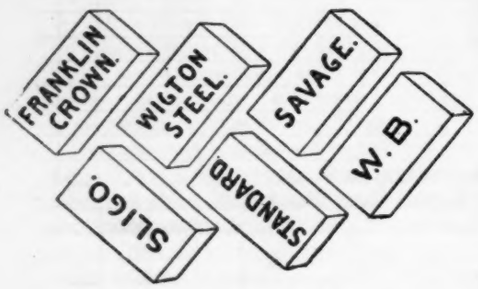

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heat, light, superintendence, clerical help, interest and repairs to buildings, taxes, insurance, etc.

The foregoing routine is followed daily and at the end of each four weeks a summary of all items is made under three general headings: labor, material and expense. I submit herewith a form of this summary.

Starting with labor, we divide according to its character into molders, coremakers, helpers, cleaners and general labor. The first table under this head gives the total cost of labor classified. A line is provided for each kind of labor and columns ruled for the various classes of work. Into these columns are posted the total cash expenditures in each class for each kind of labor. The molders' labor is taken direct from the Daily Time Sheet, coremakers' labor from their Time Sheet, the stock core labor having been divided in proportion to the directly ascertained amounts. The same is done with the labor of helpers and cleaners. The general labor having only been taken *in toto* for each day's work, is divided among the classes according to the weight of castings produced in each class. These amounts are all summed up and the salaries of foreman and clerk are added. The total must agree with the total pay rolls during the four weeks. In the next table we determine the labor cost per pound of good castings, and enter these amounts in their proper places. A third table headed general labor items gives the following data for each class of labor: number employed, highest, lowest and average rate of wages, total labor cost per pound of good castings and percentage of each class of labor compared to total labor. This completes the detailed summaries of labor.

The material is also summarized in detail. First a table is prepared giving each kind and weight of iron, scrap, steel, etc., used, and these amounts carried out in dollars and cents. The various amounts of salvage, sprues, gates, etc., used during the period are then added to the weight of iron melted. Below this is given the coke consumed in the cupola and its cash value; and following this the fuel used in the core ovens, sand, blacking, sea-coal, flour, etc., and all other supplies used in the foundry, with the exception of the

Daily Product Sheet.

Cast on .....

Class	Order No.	Description.	Pattern No.	Date Ship'd	Weight.

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materials and supplies used in the core-room, which are given separately. At the bottom of the page are two tables, one of which gives the materials and supplies in totals for each class of product, while the other gives these items divided per pound of good castings for each class.

Similarly the expenses are summarized in tables. The cost of power, light and heat are kept by the clerk in an account and their total entered under the proper head in the table which also gives the total number of hours that they were used and the number of hours overtime, if any. The clerk also keeps accounts with superintendence and clerical help, interest on and repairs of buildings, taxes and insurance, shipping and cartage, care of and receiving patterns and depreciation of plant. The totals of these accounts are posted in the table. Beyond this are given two tables giving total expenses divided into classes, and expenses per pound of good castings divided into classes; these amounts being determined according to the analysis given in my article in the *Iron Age*.

Finally a table is made showing the castings produced divided into classes and giving amounts of both good and bad castings, and percentages of bad castings to total product in detail by classes as well as for the whole output. A general table giving the total cost per pound of each class of castings, obtained by adding together the amounts from the tables of labor, material and expense next follows, and this is succeeded by a general summary, which gives items figured out for the total average per pound of good castings produced, and also gives the total amounts of iron melted in each cupola or furnace, the fuel used for this purpose and the proportion between the two.

You will notice that this gives a very complete and accurate review of the work accomplished in the foundry, and although such a report may appear prolix, it does not involve a very great amount of labor, because the daily postings and weekly totals given in the daily time sheets, together with the daily product sheets and bad casting book, already contain most of the necessary items in a partially condensed form. These reports are exceedingly valuable and frequently indicate possible economies and improvements.

In order to obtain the cost of any individual casting, the date when shipped is looked up, and from the daily product sheet the date of casting is determined. The molders' and coremakers' tickets for this casting are then taken from the files and the direct labor is determined from them, as well as the weight from the daily product sheet. If the casting was made from the average mixture, then the cost of the melted iron is determined from the table giving costs of materials per pound of good castings produced. This is added to the cost of direct labor and to the sum are added the cost per pound for indirect labor, material and expense, multiplied by the weight of the casting. The final sum gives the actual cost of the casting. It will be found that the indirect items of cost do not vary materially from one period to the next, and therefore these amounts taken from the period preceding that in which the casting was made will give very accurate results.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

At Crowley, La., A. G. Quinn will equip a machine shop.

At Sault Ste Marie, Mich., the water power company, which recently purchased land and water power there, is about to break ground for a machine shop. F. H. Clergue may be addressed.

New Construction:—

The foundry of the Buescher Manufacturing Co., of Elkhart, Ind., totally destroyed by fire recently, will be rebuilt at once.

The Mobile & Ohio Railroad has let a contract for erection of its shops and machinery at Mobile, Ala. Fifty hands will be employed.

The Baltimore Malleable Iron & Steel Casting Company is putting up a new building 40x210 feet, and will put in the necessary machinery to double its present output.

The General Electric Co., Schenectady, N. Y., is preparing plans and specifications for a new building 92x350 feet, which will be used for an erecting and testing shop. This building will be of brick and steel construction and will have two wide galleries running its whole length.

The Shickle, Harrison & Howard Iron Co., St. Louis, is preparing plans for an extensive new steel foundry and cast iron pipe plant to be built on a 50 acre tract at Clifton Heights. The main foundry will be adapted to the manufacture of car couplers, car bolsters and steel motor gears. The iron foundry will have three pits and cast iron pipe will be made, from 60 inches down. A large and well equipped machine shop will be built.

Fires and Accidents:—

At Beaver Falls, Pa., the foundry and machine shop of Harn, Ow & Co., was destroyed by fire Sept. 23. Loss $40,000.

Fire communicated from near-by lumber yards destroyed the Fond du Lac furnace at Fond du Lac, Wis., Sept. 22. The loss is $25,000. E. A. Carry and J. B. Perry are the principal owners. The Wisconsin Furnace Co. was lessee. About 20,000 tons a year of charcoal iron was produced, but the plant has not been active the past two years.

The bursting of a fly-wheel at the Arethusa Iron Works sheet mill, New Castle, Pa., sent pieces through the roof, but no one was hurt.

Additions, Enlargements, Removals, Etc.:—

The York Wire Cloth Co., York, Pa., is erecting a new pattern shop.

The Cedar Point Foundry, of Port Henry, N. Y., is making an addition to the machine shop and also a new pattern room.

The Michigan Bolt & Nut Works, Detroit, Mich., has had plans prepared for a two-story factory, 75x550 feet, at Wight st. and Meldrum av. It will cost $17,000.

The Cincinnati Milling Machine Co., of Cincinnati, O., will erect an additional story to the present building, 125x50 feet, to be completed within 30 days, this to be followed by an L 65x110 feet, three stories high.

General Industrial Notes:—

The rolling mill of the Douglassville Iron Co. of Douglassville, Pa., has started.

Park Bro. & Co., Pittsburg, have contracted for an additional 35-ton open-hearth basic steel furnace.

The Lackawanna Iron & Steel Co., of Scranton, Pa., will blow in an additional furnace at the Scranton works.

A 70-ton traveling crane made by the Industrial Works of Bay City, Mich., is being erected at Jones & Laughlins' plant at Pittsburg.

The Durham Furnace of Cooper, Hewitt & Co., at Riegelsville, Pa., idle for a long time, is being relined and will soon be blown in.

H. M. Myers Co., shovel manufacturers, of Beaver Falls, Pa., have had a large business in the past 12 months. A wage advance is talked of for Oct. 1.

The South Boston Iron Works, Middlesborough, Ky., have been sold by the master commissioner to the Middlesborough Town & Land Co. for $63,000.

The Standard Oil Co. has contracted with the Union Iron & Steel Co., Youngstown, O., for 6,000 tons of hoops, deliveries extending over the next 12 months.

A Wheeling dispatch says that the Wheeling Iron & Steel Co. gave 1,000 of its Benwood, W. Va., employes an advance of 10 to 15 per cent in wages Sept. 23

The American Tin Plate Co., of Elwood, Ind., has increased its capital to $1,200,000. The 16 hot mills, 14 cold mills, and 22 tinning stacks are running full time.

A 14-inch cold rolling mill has just been completed by the Superior Steel Co., Carnegie, Pa. A week's shut-down recently, for repairs to machinery was the first in three years.

The Douglass Furnace plant at Sharpsville, Pa., owned by Pierce, Kelley & Co., consisting of two alternate stacks, has been sold to the Carnegie Steel Co., Ltd., at sheriff's sale, on suit brought by the Farmers' & Mechanics' National Bank, of Sharpsville.

The Maryland Steel Co. is cleaning up about its blast furnace plant preparatory to putting one stack in blast on foreign ore, the output for several months being taken by Naylor & Co. No other portion of the plant now idle will be started up in the near future.

The first product of the York Mfg. Co.'s structural mill at Ironton, Duluth's suburb, two beams, 28 feet long and 18 inches wide, with eight-inch flange, have been shipped for use in supporting the boilers of a Lake Superior saw mill plant. The York mill has facilities for turning out 36-inch beams.

The two new furnaces under construction at Duquesne by the Carnegie Steel Co. are to have a daily capacity of 500 tons each. They will each be 100 feet high, or 10 feet higher than the tallest stacks in the Edgar Thomson group. The boshes will be 26 feet or four feet more than the largest diameter of present furnaces.

The strike at the South Tenth st. mill of the Oliver Iron & Stee Co., at Pittsburg, in progress for nearly four months, has been declared off by the men. As the mill has been making full time with new men, there is no work for the strikers at the

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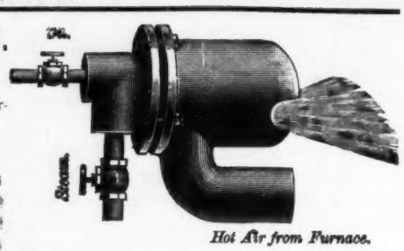

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Bolt and Nut Works.

THE UPSON NUT CO., Manufacturers of Nuts Washers, Carriage, Machine, Plow, and Elevator Bolts, Coach Screws, etc.

present time. They may be given employment later. They have been out for the sole object of securing the acceptance of the Amalgamated Association scale and the recognition of that organization. The management is paying scale prices, but refused to treat with the men on any other basis than as individuals.

The Berlin Iron Bridge Co, of East Berlin, Conn., has just completed for the Geo. W. Stafford Mfg. Co., Providence, R. I., a new machine shop 50 ft. wide and 174 ft. long, two stories high. The building is constructed of brick and iron and is so designed that two additional stories may be added later. The same company has also just completed a new car barn 86x188 feet for the New Haven Street Railway Co.

The Tabor Mfg. Co., of New York, builder of automatic molding machines, has recently been reorganized, with the following officers: Harris Tabor, president; Angus Sinclair, vice-president; E. H. Mumford, secretary and treasurer. The office is at 39 Cortlandt street, New York. The Tabor molding machine has been proving its adaptability to a constantly widening range of work, and its manufacturers have been more and more successful in the past year in enlisting the interest of foundrymen. Two additional new engines have just been started by the Shelby Steel Tube Co., of Shelby, O. The company is now working on the last three-story building, and when this is complete will have nine engines in operation, with all modern improvements. It will then be the largest tube manufacturer in the world, having a capacity of 61 benches, and a product from 1,500,000 to 2,000,000 feet per month.

The Atlanta Exposition.

One of the greatest fairs ever known to America. Many features of the Chicago World's Fair and new ones. Open Sept. 18 to Dec. 31. Low rates via the Queen & Crescent Route. Write to W. C. Rinearson, G. P. A., Cincinnati, O., for printed matter.

Excursion to Pittsburg.

Via Pennsylvania Lines, Saturday, Sept. 28; rate $3 round trip from Cleveland. Tickets good on all trains and good to return until Monday, Sept. 30. Pittsburg Exposition is now open. For full information as to trains, etc., address C. L. Kimball, Ass't Gen'l Passenger Agent, 149 Superior street.

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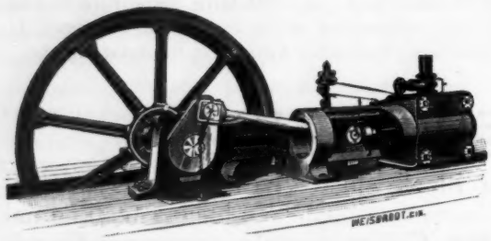

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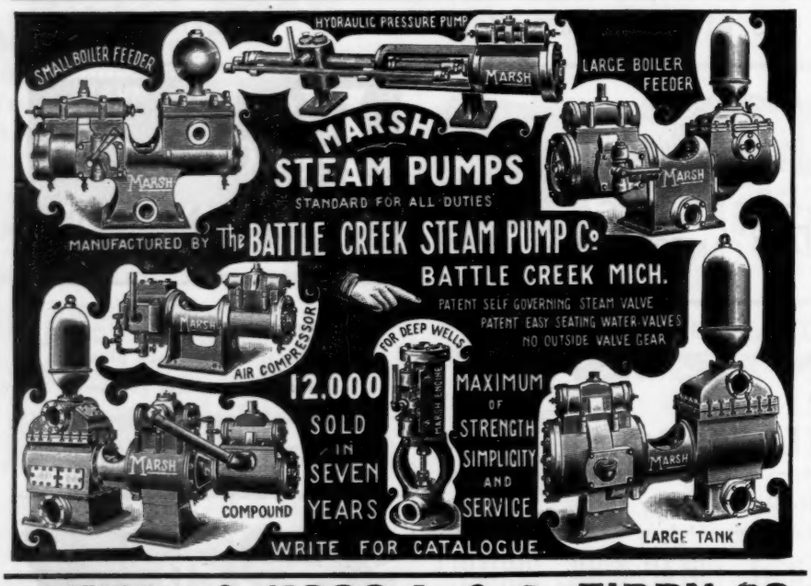

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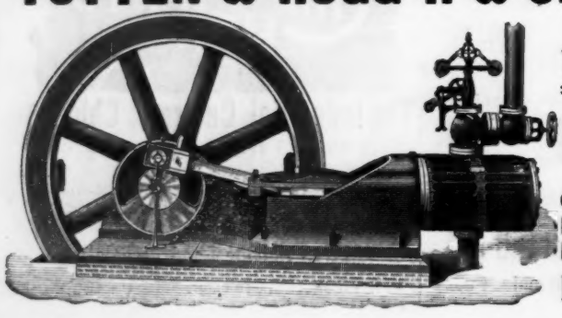

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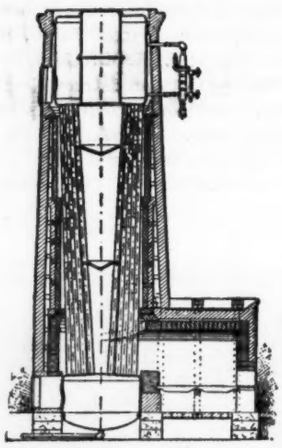

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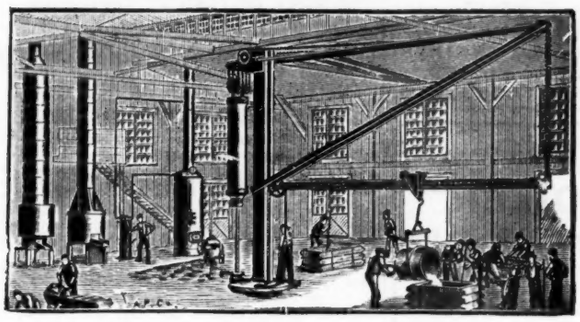

5-ton Steam-Hydraulic Crane in a Foundry.

* * * * * * **"Up to the present time we have made 15 of these pieces without the loss of a single casting. We use the Ridgway Balanced Steam-Hydraulic Crane in our Foundry and we attribute our success to the gentleness, ease and wonderful smoothness with which these Cranes handle difficult moulds of this description."** * * * * *

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With it the same moulders for the same wages can do 50 per cent more work than with any other Crane.

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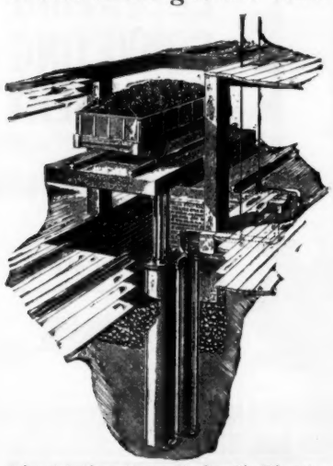

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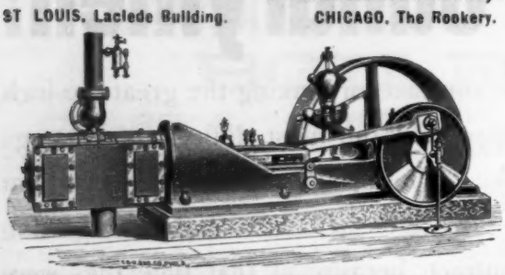

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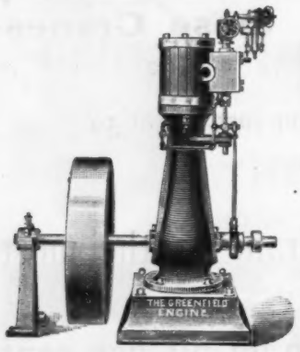

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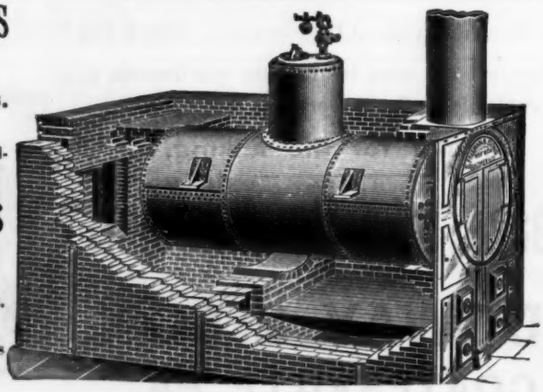

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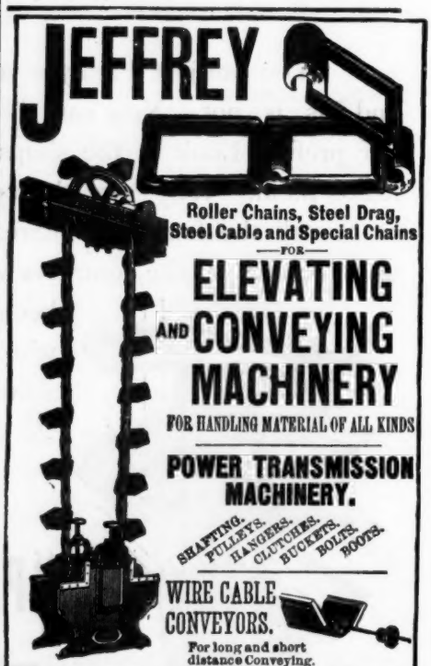

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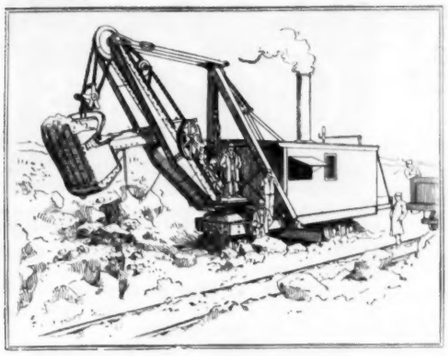

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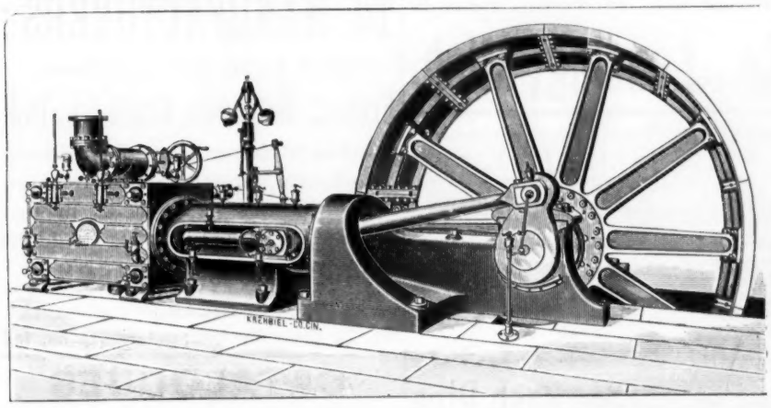

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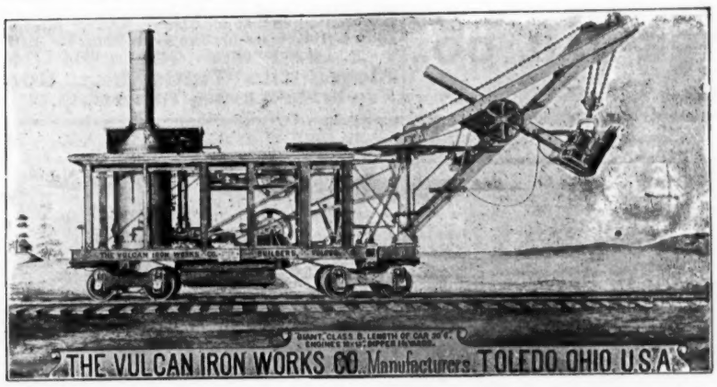

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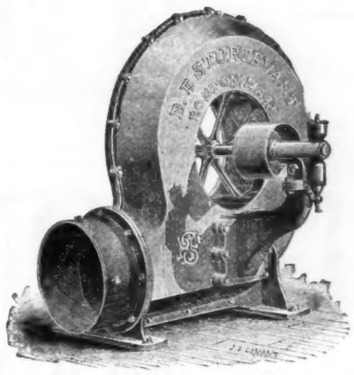

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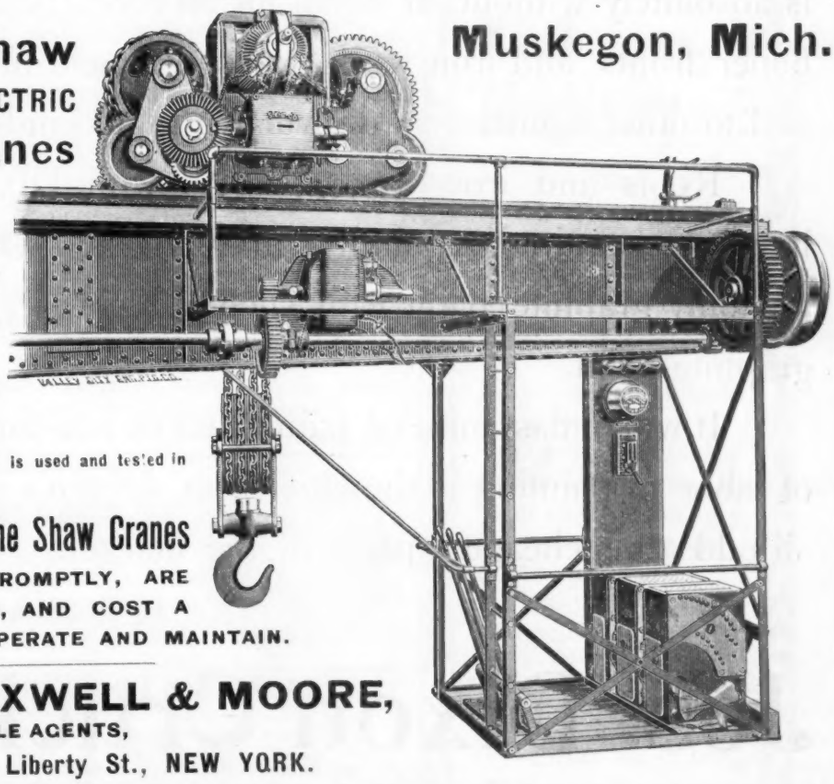

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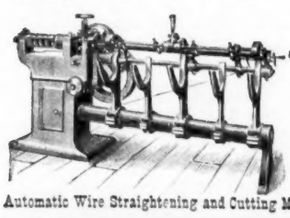

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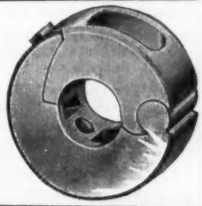

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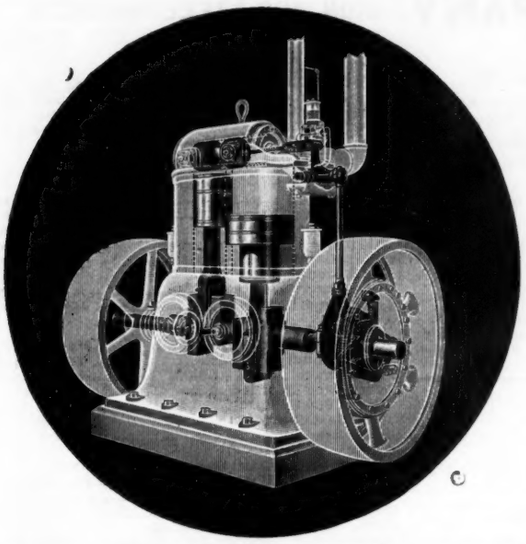

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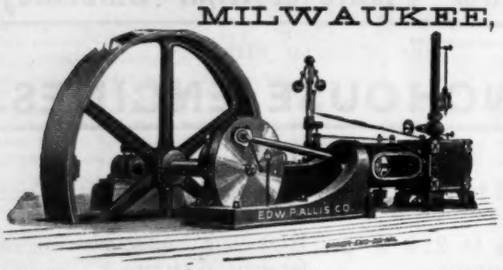

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Stowe, Fuller & Co	16
Sturtevant Co., B, F	2-25
Sykes Iron Roofing Co	27
Tanite Co	36
Taylor & Boggis Foundry Co	1
Thurman Fuel Oil Burner Co	18
Tod, Wm. & Co	34
Toledo Machine & Tool Co	35
Totten & Hogg I. & S. F'dry Co	20
Union Electric Co	35
Union Mining Co	16
United States Heater Co	36
Universal Telephone Co	1
Upson Nut Co	18
Vulcan Iron Works	23
Wertheim, Ed	1
Westinghouse Machine Co	29
Westmoreland Fire Brick Co	31

If you are thinking of enlarging you mill, foundry or machine shop, or of purchasing machinery of any kind, send us a line giving character of machinery needed. We can put you in communication with manufacturers from whom you can buy advantageously.

The Industrial Centre of Chicago

offers **Free Factory Sites** and other inducements.

If you are seeking a new location it will pay you well to investigate the merits of our proposition

Chicago Heights Land Association

M. H. KILGALLEN, Gen'l Mgr. CHICAGO

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

No. 1 Specular, Bessemer	$4 75@ 5 00
No. 1 Bessemer hematite	4 25@ 4 50
Hematites No. 1 non-Bessemer	2 50@ 3 00
No 1. Specular, non-Bessemer	3 00@ 3 50

PIG IRON.

CLEVELAND (f. o. b. cars):

Bessemer	$17 00@ 17 15
No. 1 Strong Foundry	15 25@ 15 65
No. 2 Strong Foundry	14 50@ 15 00
No. 1 Gray Forge, red short	13 75@ 14 00
No. 2 Gray Forge, neutral	13 00@ 13 25
No. 1 American Scotch	15 65
No. 2 American Scotch	14 65@ 15 15
Lake Superior Charcoal	15 50@ 16 00

PITTSBURG:

No. 1 Foundry	$14 75@ 15 00
No. 2 Foundry	14 00@ 14 25
Gray Forge	13 50@ 13 90
White and Mottled	12 75@ 13 25
Warm Blast Charcoal	16 00@ 17 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	17 00@ 17 15

CHICAGO (reported by our representative:)

Lake Superior Charcoal	$14 50@$15 50
Local Coke Foundry No. 1	14 00@ 15 00
Local Coke Foundry No. 2	13 50@ 14 50
Local Coke Foundry No. 3	13 00 .....
Local Scotch Foundry No. 1	14 00@ 14 50
Local Scotch Foundry No. 2	14 00@ 14 50
Local Scotch Foundry No. 3	12 50@ 13 00
Southern Coke No. 1	10 70@ 11 00
Southern Coke No. 2	14 00 .....
Southern Coke No. 3	13 65 .....
Southern No. 1 Soft	14 15 .....
Southern No. 2 Soft	13 90 .....
Southern Silveries No. 1	15 25@ 15 75
Southern Silveries No. 2	15 15 .....
Jackson Co. Silveries	15 50@ 16 00
Ohio Silveries No. 1	15 00@ 15 50
Ohio Silveries No. 2	14 50@ 15 00
Ohio Strong Softeners	15 00@ 15 50
Alabama Car Wheel	17 00@ 17 50
Malleable Bessemer	.....
Coke Bessemer	.....

CINCINNATI (reported by Rogers, Brown & Co.)

Southern Coke No. 1, Foundry	$13 00@$ .....
Southern Coke No. 2 and No. 1 Soft	12 75@ 13 00
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Silvery No 1	14 00@ 15 00
Southern Coke, Gray Forge	12 50
" " Mottled	12 25@ 12 50
Standard Alabama Car Wheel	15 75@ 16 25
Tennessee " "	14 50@ 15 00
Lake Superior " "	15 50@ 16 50

BUFFALO (reported by Rogers, Brown & Co.)

No. 1 Foundry Strong Coke Iron Lake Superior Ore	$15.25@$15 75
No. 2 Foundry Strong Coke Iron Lake Superior Ore	14 75@ 15 25
Ohio Strong Softener No. 1	16 25@ 16 75
Jackson Co. Silvery No. 1	15 75@ 16 75
Lake Superior Charcoal	15 25@ 16 25
Southern Soft No. 1	15 15@ 15 65
Hanging Rock Charcoal	18 50

ST. LOUIS (reported by Rogers, Brown & Meacham):

Southern Coke No 1	$13 00@$13 25
Southern Coke No. 2	12 75@ 13 00
Southern Coke No. 3	12 50@ 13 00
Southern Gray Forge	12 25@ 12 50
Southern Charcoal No. 1	14 50@ 15 00
Missouri Charcoal No. 1	14 00@ 15 00
Ohio Softeners	15 00@ 15 50
Lake Superior Car Wheel	15 50@ 16 00
Southern Car Wheel	16 00@ 16 50

OLD RAILS AND SCRAP METAL.

	Gross Tons
Old iron rails	$17 50
Old steel rails	14 50
Old Car Wheels	12 50
	Net Tons
No. 1 R. R. wrought scrap	$15 00
Mill scrap	12 00
No. 1 Machine cast scrap	11 00
Iron axles	21 00
Axle turnings	10 50
Wrought turnings (free from cast)	9 50
Cast borings	8 50
Uncut wrought iron boilers	7 00
Steel boiler plates	12 50
Grate bars	7 50
Pipes and flues (clean)	10 50
Tank iron	10 50
Hoop and band iron	8 00
Sheet iron	8 00
Wrought drillings	9 00
Malleable iron	8 00

STRUCTURAL MATERIAL.

Beams and Channels (Cleveland mill)	1.75c@1.85c
Angles	1.75c
Tees	1.80c@1.90c
Universal Plates	1.90c
Sheared Plates	2.00c

MERCHANT IRON AND STEEL.

[List prices out of store.]

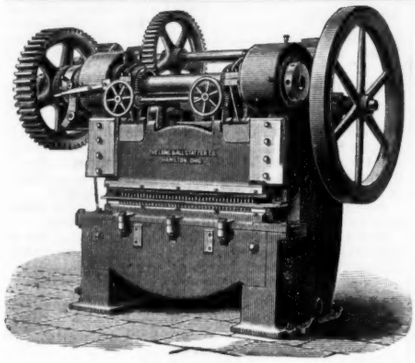
Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 60
4½ to 6 by ⅜ to 1 inch	1 65
1¾ to 6 by 1¼ to 2 inch	1 80
1¼ & 1⅜ by ⅜ to ¾ inch	1 65
1 & 1⅛ by ⅜ to ⅝ inch	1 70
⅛, ¼, ⅜, by ⅜ to ⅝ inch	1 80

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.
THE CADY MFG. CO.
18, 20 and 22 Johnson St., CLEVELAND, O.

SEND FOR OUR NEW CATALOGUE OF Power Presses, Drop Hammers, Punches and Shears, Wire Working and Special Machinery.

PERFORATED METALS
OF ALL KINDS FOR
MILLING MINING AND AGRICULTURAL MACHINERY,
PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.
THE ROBERT AITCHISON. PERFORATED METAL CO.,
OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.


Multiple Punch.

—THE—
Long & Allstatter Co.
HAMILTON, O., U. S. A.
Manufacturers of Belt, Steam and Electrically driven
Power Punches and Shears
or all kinds of Boiler, Tank and Structural Iron Work, Rolling Mills, Locomotive Shops, Car and Wagon Shops, Plow Shops, etc. Send for catalogue.

A. H. LEITCH, PREST. JOHN C. LEITCH, SEC. AND TREAS.
WESTMORELAND FIRE BRICK CO.
MANUFACTURERS OF HIGH GRADE **FIRE BRICKS.**
PITTSBURG, PA.
Works and Mines, Westmoreland, Pa.

DIXON'S GRAPHITE PAINT
FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL.
Tin roofs well painted have not required repainting for 10 to 15 years.
If you need any paint it will pay you to send for circular.
JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

IRON CLAD PAINT CO.
Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.
CLEVELAND, OHIO.

TRADE MARK REGISTERED.
ORDER DIRECT FROM THE
Iron Clad Paint Co.
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.
IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.
FURNISHED both Dry and Ground in Oil
USED BY NEARLY ALL THE RAILROADS.

Round and Square.

1 to 1⅜ inch	1 60
2 to 2⅜ inch	1 80
2⅜ to 3¼ inch	1 75
3⅜ to 4 inch	2 10
4¼ to 4½ inch	2 70
4¾ to 5 inch	2 90

Oval.

⅜ to 1¼ inch	1 80
½ to ¾ inch	1 80
½	2 00
⅝	2 20

Half Oval and Half Round.

1¼ to 3 inch	2 15
⅜ to 1¼ inch	1 95
½ to ¾ inch	2 20
½	2 35
⅝	3 45

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 70
1 to 1⅜ by ¼ and 5-16 inch	1 75
¾ to ⅞ by ¼ and 5-16 inch	1 85
½ to ⅝ by ¼ and 5-16 inch	2 10

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	2 15
1 7-16 to 2, No. 17, 18 and 19	2 20
1 7-16 to 2, No. 20	2 30
1 7-16 to 2, No. 21	2 40
1 7-16 to 2, No. 22	2 50
1⅛ to 1⅜, No. 13, 14 and 15	2 20
1⅛ to 1⅜, No. 16, 17 and 18	2 25
1⅛ to 1⅜, No 19 and 20	2 30
1⅛ to 1⅜, No. 21	2 40
1⅛ to 1⅜, No. 22	2 50
15-16 and 1 inch, No. 13, 14 and 15	2 15
15-16 and 1 inch, No. 16, 17 and 18	2 30
15-16 and 1 inch, No. 19 and 20	2 40
15-16 and 1 inch, No. 21	2 50
15-16 and 1 inch, No. 22	2 60
⅞, No. 13, 14 and 15	2 40
⅞, No. 16, 17 and 18	2 50
⅞, No. 19 and 20	2 60
⅞, No. 21	2 70
⅞, No. 22	2 80
13-16, No. 13, 14 and 15	2 50
13-16, No. 16, 17 and 18	2 60
13-16, No. 19 and 20	2 70
13-16, No. 21	2 80
13-16, No. 22	2 90
¾, No. 13, 14 and 15	2 60
¾, No. 16, 17 and 18	2 75
¾, No. 19 and 20	2 85
¾, No. 21	2 95
¾, No. 22	3 05
11-16, No. 13, 14 and 15	2 85
11-16, No. 16, 17 and 18	2 90
11-16, No. 19 and 20	3 00
11-16, No. 21	3 10
11-16, No. 22	3 20
11-16, No. 23	3 30
⅝, No. 13, and 15	2 50
⅝, No. 16, 17 and 18	3 00
⅝, No. 19 and 20	3 10
⅝, No. 21	3 20
⅝, No. 22	3 30
⅝, No. 23	3 40
9-16, No. 13, 14 and 15	3 10
9-16, No. 16, 17 and 18	3 20
9-16, No. and 20	3 30
9-16, No. 21	3 40
9-16, No. 22	3 50
9-16, No. 23	3 60
7-16 and ½ inch, No. 13, 14 and 15	3 30
7-16 and ½ inch, No. 16, 17 and 18	3 40
7-16 and ½ inch, No. 19 and 20	3 50
7-16 and ½ inch, No. 21	3 60
7-16 and ½ inch, No. 22	3 70
7-16 and ½ inch, No. 23	3 80
⅜, No. 13, 14 and 15	3 80
⅜, No. 16, 17 and 18	3 90
⅜, No. 19 and 20	4 00
⅜, No. 21	5 31
⅜, No. 22	4 40
⅜, No. 23	4 55

Light Band.

1½ to 6 by ¼ to 3-16 inch	1 90
1½ to 6 by Nos. 11 and 12	1 95
1 to 1¾ by ¼ to 3-16 inch	1 95
1 to 1¾ by Nos. 11 and 12	2 00
¾ and 13-16 by ¼ to 3-16 inch	2 10
¾ and 13-16 by Nos. 11 and 12	2 15
¾ and 11-16 by ¼ to 3-16 inch	2 20
¾ and 11-16 by Nos. 11 and 12	2 25
⅝ and 9-16 by ¼ to 3-16 inch	2 35
⅝ and 9-16 by Nos. 11 and 12	2 40
½ by ¾ to 3-16 inch	2 50
½ by Nos. 11 and 12	2 55

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	2 10
⅞ inch, " " " " 13 and 14	2 20
¾ inch, " " " " 11 and 12	2 25
¾ inch, " " " " 13 and 14	1 55

Sheet Iron.

No. 10	2 10
No. 12	2 20
No. 14	2 25
No. 15-17	2 35
No. 18	2 50
No. 20	2 65
No. 22-24	2 75
No. 25-26	2 85
No. 27	2 95

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 00
Shell	2 15
Flange	2 25
Marine Flange	2 60
Fire Box	3 70

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. ₰. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ₰s.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½

JESSOP'S STEEL —FOR— Tools, Drills, Dies, etc.

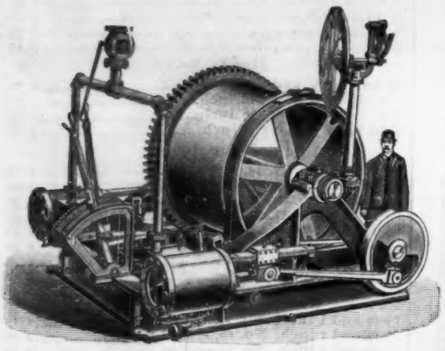
Established over a Century ago. Manufactory, SHEFFIELD, ENGLAND.

CHIEF AMERICAN OFFICE, 91 JOHN ST., NEW YORK.

WM. JESSOP & SONS, Limited.

"Medal—World's Columbian Exposition, 1893."

All sizes carried in stock by The W. Bingham Co., Cleveland, Ohio.



HOISTING MACHINERY for Mining, Quarrying, Coal Handling, Pile Driving, Bridge Building, Log Hauling and for general Contractors' Use. Improved Electric Hoists, single and double Patent Friction Drum, compound, geared with brakes and reversible for general Hoisting. Mining Purposes and Suspension Cable Ways.

Send for Illustrated Catalogue giving full description, etc.

CORRESPONDENCE SOLICITED.

W. A. CROOK BRO'S CO.,

117-123 Poinier St.,

Salesrooms, 143 Liberty St., N. Y. Newark, N. J.

W. H. COFFMAN COKE CO.

BLUEFIELD, W. VA.

GENERAL FACTORS AND SHIPPERS OF

POCAHONTAS FLAT-TOP COKE.

So low in ash that it requires no fluxing for foundry purposes. Our foundry and furnace coke was awarded the first premium at the World's Fair in 1893.

AVERAGE ANALYSIS OF COKE.

Moisture	00.196	Sulphur	00.677
Fixed Carbon	93.625	Ash	05.004
Volatile Matter	00.494		

Foundry, Furnace and all sizes of crushed coke. Guaranteed lower in Sulphur than any other commercial coke

WHO IS THE "NEXT"?

We have sold our goods to 50 bicycle manufacturers, in the last 30 days, besides supplying our regular trade for Grinding and Polishing Machinery.

"First come is first served," and we would like to serve you "first," but you must send along your order.

We make all varieties of the best Grinding and Polishing Machinery.

Diamond Machine Company,

Home Office and Wks., 623 to 641 Atwells Ave., Providence, R. I. Western Branch, Chicago, Ill.

STEEL CASTINGS

OF EVERY DESCRIPTION

Made from Best Open-Hearth Steel.

SEND FOR ESTIMATES.

THE JOHNSON COMPANY, Johnstown, Pa.

For 22 Long and Successful years we have made our

"O.K." CROWN

OUR PRICES ARE JUST RIGHT

High Grade Fire Brick, in all shapes and sizes. They have stood the TEST with eminent satisfaction to our many customers, because they are made entirely on HONOR.

OAK HILL FIRE BRICK AND COAL CO. Manufacturers

OAK HILL, OHIO

7-16 to ⅝ and 2⅜ to 3 in.		.09
3¼ to 4 in.		.09½
⅞ to 11-16 and 4½		.10
⅛ to 6 in.		.10½
¾ to 9-32 and 6¾ to 7 in.		.11
7 ⅛ in		.13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	.8

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 50
Open-hearth Tire	"	1 80
Open-hearth Spring	"	2 20
Sleigh Shoe	"	1 90
Toe Calk	"	2 10
Cutter Shoes, tapered and bent	"	2 20

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base	dis. 67
Butt " " "	dis. 57
Lap " galv. "	dis. 55
Butt " " "	dis. 52
Boiler tubes 2¼" and smaller,	dis. 65 and 5
Boiler tubes 2½" and larger	dis. 67½ and 5
Casing screw and socket joint	dis. 52½
Casing inserted joint	dis. 47½

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis35
Horton's Universal	dis40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 to Flour, C. F		
	46 gr.	150 gr.	F. FF.
Kegs, ₩ lb	4½c	5 c	2¾c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

SHIFFLER BRIDGE COMPANY,

BUILDING DEPARTMENT.

SPECIALTIES: STEEL AND IRON BUILDINGS FOR ROLLING-MILLS, TIN PLATE PLANTS, STEEL WORKS, FOUNDRIES, FACTORIES, ROOF TRUSSES, GIRDERS, COLUMNS, BEAMS, CORRUGATED IRON, ETC.

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Branch Offices:
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65 Dexter Building, Chicago, Ill.
228 Lumber Exchange, Minneapolis, Minn.

FOR YOUR OUTING GO TO PICTURESQUE MACKINAC ISLAND.

ONE THOUSAND MILES OF LAKE RIDE AT SMALL EXPENSE.

Visit this Historical Island, which is the grandest summer resort on the Great Lakes. It only costs about $13 from Detroit; $15 from Tolédo; $18 from Cleveland, for the round trip, including meals and berths. Avoid the heat and dust by traveling on the D. & C. floating palaces. The attractions of a trip to the Mackinac region are unsurpassed. The island itself is a grand romantic spot, its climate most invigorating. Two new steel passenger steamers have just been built for the upper lake route, costing $300,000 each. They are equipped with every modern convenience, annunciators, bath rooms, etc., illuminated throughout by electricity, and are guaranteed to be the grandest, largest and safest steamers on fresh water. These steamers favorably compare with the great ocean liners in construction and speed. Four trips per week between Toledo, Detroit, Alpena, Mackinac, St. Ignace, Petoskey, Chicago, "Soo," Marquette and Duluth. Daily between Cleveland and Detroit, and Cleveland and Put-in-Bay. The palatial equipment makes traveling on these steamers thoroughly enjoyable. Send for illustrated descriptive pamphlet. Address A. A. SCHANTZ, G. P. A., D. & C., Detroit, Mich

Cleveland Union Station.

Pennsylvania Lines.

Foot of Bank Street.

TICKET OFFICES at Station, Euclid Av., Woodland Av., and Weddell House corner.

THROUGH TRAINS RUN AS FOLLOWS BY CENTRAL TIME
* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	12:45 pm	†12:10 pm
Akron and Orrville	† 3:25 pm	† 9:50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

Valley Ry.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	†11:00 A M
Wooster		†6:30 P M
Akron, Canton & Marietta	†2:45 P M	†11:00 A M
Steubenville, Wheeling, Washington, D. C., and Baltimore	†2:45 P M	†11:00 A M

†Daily except Sunday. *Daily. Pullman's Palace Vestibule Drawing Room cars between Cleveland and Chicago.

THE IRON TRADE REVIEW

make it a valuable adjunct to manufacturers of **machine tools, foundry supplies and power equipment.**

THE CONDIT-FULLER CO.,

Pig and Bar Iron,

CLEVELAND, . OHIO.

Oglebay, Norton & Co.,

LAKE SUPERIOR IRON ORES.

— AGENTS —

The Spanish-American Iron Co.,
Santiago, Cuba.
CLEVELAND. PHILADELPHIA.

E. C. POPE,

COMMISSION DEALER IN

Iron Ore, Pig Iron AND METALS.

Cleveland - Ohio.

ESTABLISHED 1854.

PETER GERLACH & CO.,

MAKERS OF

Saws, Tools and Machinery.

Office and Warerooms, 28 Columbus St.
Factories on Columbus, Winter and Leonard Sts.,
Cleveland, Ohio, U. S. A.

$2.50 CLEVELAND TO BUFFALO

Via "C. & B. LINE,"

Commencing with opening of navigation (about April 1st). Magnificent side-wheel steel steamers

"State of Ohio" and "State of New York."

DAILY TIME TABLE.

SUNDAY INCLUDED.

Lv. Cleveland,	6:00 P.M.	Lv. Buffalo,	6:30 P.M.
Ar. Buffalo,	7:30 A.M.	Ar. Cleveland,	7:30 A.M.

CENTRAL STANDARD TIME.

Take the "C. & B. Line" steamers and enjoy a refreshing night's rest when enroute to **Buffalo, Niagara Falls, Toronto, New York, Boston, Albany, 1,000 Islands,** or any Eastern or Canadian point.

Cheap Excursions Weekly to Niagara Falls.

Send 4 cents postage for tourist pamphlet.

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Cleveland, O.

CHICAGO HEIGHTS

The Industrial Centre of Chicago

offers **Free Factory Sites** and other inducements.

If you are seeking a new location it will pay you well to investigate the merits of our proposition.

Chicago Heights Land Association
M. H. KILGALLEN, Gen'l Mgr. CHICAGO

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 60@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3¾	3⅛
Hexagon	15½	11½	8½	6	5¾	5¾	
Washers	9	8	7	5	4½	4½	4⅛

In lots less than 100 lbs, ₱ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ₱ keg card rate	
{ Car lots	$2 30
{ Less than car lots	$2.50

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₱ doz	dis 10@10&10

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 50@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block	dis 20

Rivets.

Iron, Thousand, list November 1, 1894	dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894	dis 60@65
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&20
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	pis
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40 & 40
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c "
No. 1 Handles	23c per pair
No. 6 "	16c "
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 40
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	.95c ₱ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

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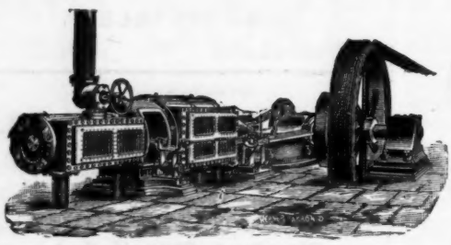

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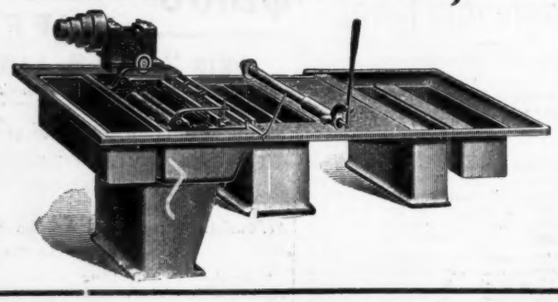

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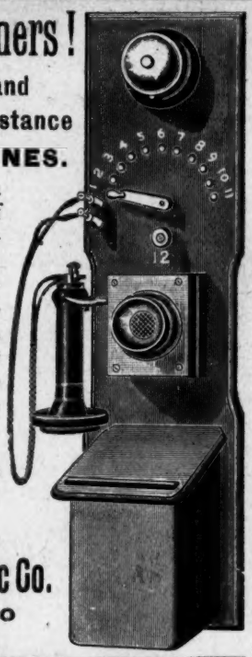

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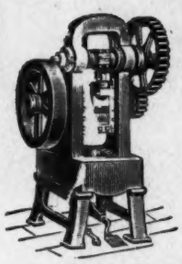

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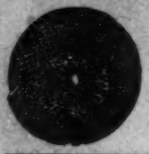

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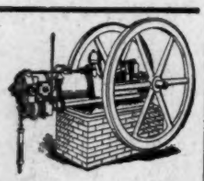

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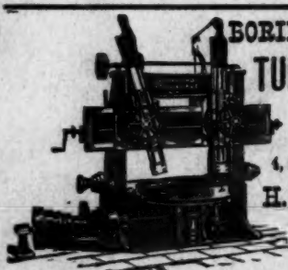

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